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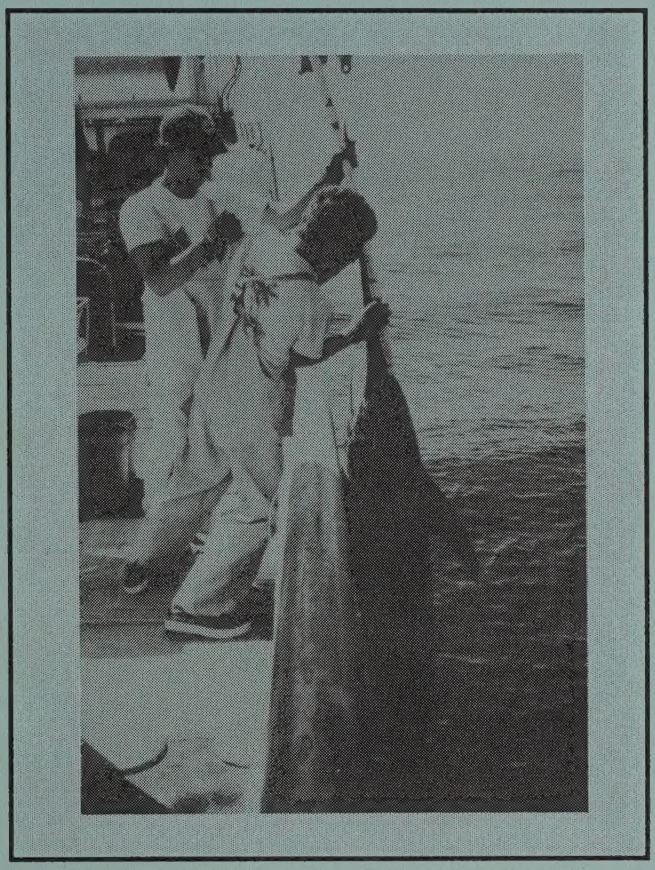
Pelagic Fisheries of the Western Pacific Region

1989 Annual Report



August 1990

Prepared by the Plan Team for the

Western Pacific Regional Fishery Management Council

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1989 ANNUAL REPORT FOR THE FISHERY MANAGEMENT PLAN FOR THE PELAGIC FISHERIES OF THE WESTERN PACIFIC REGION

Prepared by the Pelagic Plan Monitoring Team

Western Pacific Regional Fishery Management Council
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RECOMMENDATIONS

1. The Hawaii longline fleet grew to over 100 vessels in early 1990, with projections for as many as 150 longline vessels by the end of this year. The fleet now harvests as much pelagic species in and beyond the EEZ as the foreign distant water longline fleets ever did in the EEZ surrounding Hawaii. A segment of the longline fleet now targets swordfish which represents a new development for the Hawaii fishery. Swordfish landings have jumped from about 50,000 pounds per year during recent years to 500,000 pounds in 1988 to around 1.3 million pounds in the first five months of 1990. A domestic longline boat has started operating out of CNMI and domestic longline operations have occurred in American Samoa in the past. While the domestic longline fleet has become the largest and most economically significant component of Hawaii's commercial fisheries and has more than replaced the harvest formerly taken by the foreign fleets in the EEZ around Hawaii, only the volume of the landings of domestic longliners is monitored with any accuracy and even this is done on an ad hoc basis. The Council and this Team cannot monitor, assess, or manage the pelagic fishery in the western Pacific with the ad hoc collection of landings data or even with a revitalized State of Hawaii Longline Catch Report form since this is for all practical purposes a landing report and not a catch logbook. The Team, therefore, recommends the establishment of regulations requiring a Federal longline fishing permit, a landings report (submission of appropriate state reports would suffice), a transshipment report, and a daily catch log book for all domestic longline vessels fishing, transshipping, or home ported anywhere in the western Pacific Region. Logbook data are necessary for effective management of this fishery as well as for defining overfishing as required by the revised National Standards. It is critical that a significant enforcement effort be applied to ensure compliance with permit and reporting requirements by all vessels. Compliance and general support among the fishermen would be enhanced if reporting procedures could be designed to fulfill both State and Federal requirements.

2. The Team recommends setting a control-date for entry into the Hawaii longline fishery immediately to ensure the availability of adequate management options as might be needed in the future by the Council and to provide industry with an adequate planning horizon for capital investment. A majority of the Team members also recommend adopting a temporary moratorium, but complete agreement on the matter was not reached. These measures are needed for the following reasons: 1) the size of the domestic longline fleet has grown rapidly to a size never experienced previously in the western Pacific Region due to restrictions placed on longline fishing for marlins, swordfish, and sharks in the Atlantic, the decline of swordfish stocks in the Atlantic, and problems in the domestic longline fishery for tuna in the Gulf of Mexico; 2) the harvest of the

domestic longline fleet now exceeds the historical maximum EEZ catch level (1976) of foreign longliners by 14%; 3) the swordfish segment of the fishery is growing rapidly due to market demand and restrictions applied in swordfish fisheries in other regions; 4) fishery interaction problems between longline vessels and trolling and handline boats are not only likely to increase in near shore fishing grounds, but are likely to include concerns of interception and local overfishing, which were motivations in initially developing the pelagic FMP and restricting foreign longline operations in the EEZ; 5) market demand for swordfish and sashimi quality tuna is so great that market conditions cannot be counted on to "naturally" regulate the longline fisheries and indeed are likely to continue fueling expansion of the fleet; 6) the status of the PMUS stocks on a stock-wide basis is not well known because the last available data for the dominant Japanese longline fleet is for 1980 and catch statistics from Korea and Taiwan longliners are of poor quality and limited geographical coverage; 7) the status of the resources within the EEZ of Hawaii is very poorly known because many segments of the domestic longline fleet essentially stopped submitting catch reports to the State of Hawaii and the quality and quantity of the data available from the State of Hawaii for other components of the state fishery (and what little is received from longline vessels) is insufficient for stock assessment purposes, and no foreign longline fishing has occurred in the EEZ since 1980 when the PMP became effective, thus there are no data; and 8) the decline of swordfish stocks in the western Atlantic during a relatively short time is an example of what could happen in this Council's area.

Five years ago, scientists concluded that swordfish stocks in the western Atlantic were being growth overfished, but no management action was taken due to stock assessment uncertainties. Now, there is general consensus that the stock was growth overfished five years ago, and scientists believe the stock continued to decline as fishing increased and even may be approaching recruitment overfishing. Because of this, they recommend drastic reductions in fishing effort to prevent the collapse of the resource and the destruction of the industry. Discussions are now underway regarding how and to what extent to react to these large fishing effort reduction recommendations.

The majority of the Team members believe that this Council should engage in proactive management not only to conserve the longline resources but prevent economic overfishing (overcapitalization) from occurring. They believe that it would be prudent to halt the unregulated expansion of the fleet and defer extraction of additional harvest and economic benefit until it can be shown that an additional harvest can be sustainable. This strategy contrasts with waiting until sufficient evidence exists to show that the expanding fishery reached the point of biological or economic overfishing, or both, some years prior and then reacting with management measures to rebuild the stock to acceptable levels.

The latter can only be done by reducing fishing effort (mortality) which means less profit for all boats in the fishery if the reduction is spread evenly or no profit by some if some boats are excluded using a control-date for limited entry (participation). And, this management action must be taken when the participants are experiencing declining profits, which possibly threaten their economic survival. Other Team members pointed out that the entry of new boats into the Hawaii longline fishery revitalized the local industry, created a new fishery (for swordfish), and resulted in considerable additional economic benefit to the region. This occurred without any readily apparent adverse impacts on the management unit species or other longline resources.

3. The Pelagic FMP should be amended immediately to require reporting of interactions with endangered and protected species.

4. The Honolulu Laboratory's WPacFIN should complete updating the computerized annual report modules with provision for handling both survey and commercial statistics so that the island fisheries offices can run the programs themselves.

5. Support should continue to be supplied to or by the island fisheries offices for collecting data on their pelagic fisheries, including the volume of landings, revenue of sales, fishing effort, and size composition of catches.

6. Catch and effort statistics and species and size composition data from across the Pacific are important for analyzing PMUS. The NMFS field station in Pago Pago, American Samoa is a vital source of such information. Sampling for the South Pacific Tuna Treaty has taken on increased priority, but the need for quality longline data remains. The PMT recommends that efforts be taken by NMFS SWR to ensure that sampling and voluntary logbook coverage of the foreign longline fishing fleets based in American Samoa are maintained at their historical levels.

7. Purse seiners have allegedly been seen making sets on fish aggregating devices (FADs) in American Samoa. The issue of purse seine fishing near FADs and in nearshore areas and banks fished by local fishermen should be examined. Measures to protect FADs and the fish they attract for the local fleet should be considered in future amendments to the Pelagic FMP.

8. Because of the size of the foreign longline fleet based in Guam, a coordinated, possibly multiagency, data collection plan should be put in place to monitor the landings of this fishery. The Government of Guam is now collecting some data from this fleet. Transshippers/processors record detailed data on volumes by size classes for their own business purposes, but accessing these data and

evaluating the quality of the data have not been attempted. Likewise, no attempt has been made to collect vessel logbooks in Guam as is done in American Samoa.

9. The conflict between trolling and longline fishing vessels in Hawaii has been a serious problem in the pelagic fishery over the past two years. This interaction has not been, primarily, a direct gear conflict nor a direct economic (market) conflict. Rather, it has been a conflict based on one type of vessel (the longliners) apparently reducing the catchability or availability of target pelagic species to other types of vessels (trollers and handliners). Therefore, quality fishery data (with an emphasis on catch per day and per fishing area -- the data called for in the State of Hawaii commercial landings reports) are needed to conduct relevant research on the nature of the problem. Therefore, the PMT recommends the implementation of regulations, currently under development by the SWR, requiring submission of State of Hawaii catch reports for all commercial fishing vessels participating in the pelagic fishery. Data are also needed from the recreational and subsistence fisheries, but proposals for collecting this information on an on-going basis should await the completion of the State of Hawaii's current field-testing of a creel survey on Oahu.

10. Better coverage is needed of the export and transshipment of PMUS especially in light of the rapid growth of the swordfish fishery in Hawaii. Most swordfish caught by Hawaii-based longliners is exported. Growing amounts of tuna and PMUS are also exported.

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INTRODUCTION

Background

The Fishery Management Plan (FMP) for the Pelagic Fisheries of the Western Pacific Region was implemented by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (Fisheries Service) on March 23, 1987. The Western Pacific Regional Fishery Management Council (Council) developed the FMP to manage the pelagic resources covered by the Magnuson Fishery Conservation and Management Act of 1976 and occurring in the U.S. exclusive economic zone (EEZ) off the coasts of American Samoa, Guam, Hawaii, and U.S. possessions in the Western Pacific Region (the fishery management area). The goal of the pelagic FMP is to maintain pelagic stocks at optimal population levels while managing foreign fishing, promoting equitable domestic utilization of the resources by commercial, subsistence, and recreational sectors, eliminating waste from incidental harvest, and diminishing the risk of gear conflicts.

The pelagic management unit species (PMUS) covered by this FMP are given below.

Common Name	Scientific Name
Mahimahi (dolphinfish)	Coryphaena hippurus
Pompano dolphinfish	C. equiselis
Wahoo	Acanthocybium solandri
Indo-Pacific blue marlin	Makaira mazara
Black marlin	M. indica
Striped marlin	Tetrapturus audax
Shortbill spearfish	T. angustirostris
Swordfish	Xiphias gladius
Requiem sharks	Carcharhinidae
Thresher sharks	Alopiidae
Hammerhead sharks	Sphyrnidae
Mackerel sharks	Lamnidae

PMUS are caught with trolling gear, tuna and swordfish longline gear, and handline gear. They are caught in oceanic as well as insular pelagic waters. Most of these species are considered to be epipelagic because they occupy the upper most layers of the pelagic zone. All are high predators in the trophic sense. Pelagic fisheries, for

PMUS and tunas, are important, if not the most important, components of most Pacific island fisheries.

The pelagic FMP requires the Council's Pelagic Plan Monitoring Team (Team) to prepare an annual report on the status of the pelagic fisheries taking place in each of the island areas served by the Council (American Samoa, Guam, Hawaii, and Northern Mariana Islands), evaluate the effectiveness of the FMP in meeting its goals and objectives, and make recommendations for future management and administrative action.

Report Content

This, the third annual report, contains fishery performance data through 1989 (Appendices), interpretations of trends or important event occurring in the fisheries, and recommendations. Sections on plan administration and enforcement activities as well as a discussion of the habitat of the management unit species are also included.

The Team revised the format of the report to reduce the time and effort necessary to produce the report and to concentrate efforts on those items of importance in managing the fisheries. In this regard, the Team followed the guidelines and procedures developed at the FMP Monitoring and Assessment Workshop conducted in November 1989 (Pooley 1990) and developed draft indicators to be used for evaluating blue marlin fisheries as well.

This report was prepared using modules submitted by the following agencies: National Marine Fisheries Service, Southwest Region including its Southwest Fisheries Center Honolulu Laboratory (Honolulu Laboratory) and Office of Law Enforcement; the Territory of American Samoa Department of Marine and Wildlife Resources; the Territory of Guam Division of Aquatic and Wildlife Resources; and the Commonwealth of the Northern Mariana Islands Division of Fish and Wildlife.

Report Appraisal

From the viewpoint of completeness, this report may be the worst the Team has produced. From the viewpoint of documenting significant events and developing subtantive recommendations for Council actions, this report may be the most eventful.

The Team was successful in streamlining the preparation of the annual report as well as the length of the report. This was accomplished by presenting most data in time-series graphical form (instead of in tables) and by including only those statistics and indicators necessary to evaluate the status of the resources and the fisheries on them. We believe this results in a more readable report as well as one that

concentrates on what is important, rather than filing pages with interesting information which is not directly connected with the recommendations.

The Team fell short of its goal with respect to fishery indicators, i.e. to include catch per unit (fishing) effort statistics and size composition data for blue marlin from all areas on this annual report. Graphical representations of size composition for blue marlin are presented for American Samoa, Guam, and Northern Marian Islands, but catch per unit of effort graphs are presented only for Guam. Unfortunately, a comprehensive review of Hawaii blue marlin statistics was not possible.

Summaries of State of Hawaii fishery data for a number of past years (1989 data were incomplete) were prepared following approximately the same format as used last year for the other island fisheries, thus meeting one of the Team's goals. However, since charts of the summarized statistics were not prepared, no State of Hawaii fishery statistics could be included given the current format of the annual report. NMFS estimates of Hawaii pelagic landings for 1987-89 are included in the report.

The Team also set a goal to include data derived from statistically designed surveys, which include all segments of the American Samoa, Guam, and Mariana Islands fisheries, rather commercial statistics alone as in previous reports. Survey data provides estimates of total catch and fishing effort by commercial, subsistence, and recreational fishermen. Since using survey data required a complete revamping of the computer procedures for summarization of the data and plotting, the results were not available as early in the process of preparing the annual report as desirable. Also, the results are not as polished or homogeneous, among the island fisheries, as desirable.

The findings, conclusions, and recommendations in this report are those of the Team and do not necessarily reflect those of the Scientific and Statistical Committee (SSC), the Council nor the organizations of which Team members are employed.

SYNOPSIS AND SUMMARY

1. The Hawaii fishery for PMUS (with commercial landings of 5.8 million pounds having an ex-vessel value of $7.7 million) is much larger than the fisheries for PMUS in the other island areas under the jurisdiction of the Council. In comparison, the Guam fishery landed 0.31 million pounds, down from the peak in 1988, but still following a general increasing trend since 1980. In contrast to all other management areas including the Northern Mariana Islands, Guam PMUS landings exceed tuna landings (0.17 million pounds) because of significantly different social and market preferences for mahimahi and wahoo rather than for tuna. Commonwealth of the Northern Mariana Islands PMUS landings were down somewhat to 0.01 million pounds, but no trend is apparent. The American Samoa fishery the PMUS landings amounted to 0.02 million pounds, down from 1988 but showing no trend. Many apparent changes in 1989 landings compared with those reported in previous annual reports are due to changes in the treatment of data and/or use of different data sets rather than changes in the fisheries.

2. The 1989, Hawaii landings for all pelagic species (13.2 million pounds) increased 12% over 1988 and 44% over 1987 while for PMUS alone (5.8 million pounds in 1982) the growth in estimated landings are 43% in 1987 and 63%in 1988, respectively. While Guam landings of PMUS declined to 0.50 million pounds from the record high in 1988, there appears to be no upward or downward trend. American Samoa landings declined somewhat from 1988 to 0.20 million pounds in 1989; however, no trend is apparent. Commonwealth of the Northern Mariana Islands pelagic landings declined somewhat to 0.23 million pounds in 1989, but no trend is apparent.

3. In 1989, the Hawaii longline fleet landed 9.8 million pounds of pelagic fish with 35% or 3.4 million pounds being PMUS and 59% or 5.8 million pounds being tunas. For the second year in a row, the longline fleet has landed more PMUS and tunas than the troll and handline fleets together, and the gap is widening due to increasing longline landings and decreasing troll and handline landings. Longliners now catch most of the billfish landed in Hawaii, including about half of the blue marlin landed in 1989.

4. The 1989, domestic longline landings in Hawaii of fish caught inside and beyond the EEZ exceeded the largest amount ever landed in the EEZ surrounding Hawaii by foreign longline fleets, which was 8.6 million pounds in 1976. In addition, the foreign fleets reported catching only 13% billfish in 1976, which amounted to some 1.1 million pounds. Billfish landings by the Hawaii longline fleet were this magnitude in 1988 and were double it in 1989.

5. In Hawaii a swordfish longline fishery was initiated in 1989 with landings of approximately 500,000 pounds, representing 10% of the PMUS landings. The fishery has continued to expand in 1990 and must now be regarded as a major U.S. swordfish fishery. Compared to many other swordfish fisheries, unusually large and small fish occur in the Hawaii fishery for swordfish. The average size of swordfish has remained very stable from 1984-89. Swordfish catches made by domestic fishermen in Guam, Commonwealth of the Northern Mariana Islands, and American Samoa were nearly non-existent in 1989. A small amount of swordfish were landed in the CNMI in 1990 by a domestic longline boat which recently started operating there.

6. Blue marlin landings increased to record levels in every area. In Hawaii blue marlin landings account for 30%, the largest proportion, of the PMUS commercial landings. The landings of 1.53 million pounds represents a 50% increase over 1988, a 61% increase over 1987 (225% and 583%, respectively, for the longline fleet), and probably a record landing. In Guam, blue marlin landings increased to a record high of 0.11 million pounds continuing what appears to be a general upward trend. The 1989 landings accounted 35%, the largest proportion, of the PMUS landings. Similarly in American Samoa, blue marlin landings increased to a record level (0.01 million pounds or 50% of the PMUS landings); annual landings have fluctuated wildly and show not apparent trend. In the Commonwealth of the Northern Mariana Islands, marlin catches (presumably mostly blue marlin) increased to a record high of 4,600 pounds or 39% of the PMUS landings, but no trend is apparent.

7. The average size of blue marlin has oscillated in Hawaii and on a Pacific-wide basis based on composite statistics. In Hawaii, the average size of blue marlin has currently declined to below 200 pounds, but not below the minimum recorded in 1974. In Guam, the average size of blue marlin seems to be relatively stable with large fish being more abundant in some years than others. The sizes of blue marlin in the Commonwealth of the Northern Mariana Islands fishery are very similar to those in Guam fishery. In American Samoa, mean weight of blue marlin has fluctuated substantially but without apparent trend. Females weighing nearly 800 pounds have been recorded. All fisheries are characterized by a dominant mode of mostly male fish, having a mean size which fluctuates without trend and is generally less than 200 pounds, and by the variable occurrence of large females.

8. Striped marlin ranks second among the PMUS in Hawaii where it accounts for 28% of the commercial landings of PMUS. The landings of 1.47 million pounds represents a 9% increase over 1988 and 68% over 1987 (21% and 124% for the longline fleet). Striped marlin is regarded as a secondary target species after bigeye tuna in the winter longline fishery. The species rarely

appears in the domestic landings in other management areas because there are no domestic longliners yet operating in these areas except for one in Saipan.

9. Shortbill spearfish landings (less than 485,000 pounds) made up less than 9% of the 1989 commercial landings in Hawaii and rarely appears in the landings in other management areas.

10. Sailfish landings are insignificant in all management areas, but more are reported in Guam and American Samoa where they are seemingly more abundant compared to Hawaii.

11. Mahimahi landings (817,000 pounds) made up 16% of the 1989 commercial PMUS landings in Hawaii, which is a 18% decline from 1987 (33% decline for the troll and handline fleets). In Guam, mahimahi landings declined from the record high in 1988 to 87,000 pounds or 28% of PMUS landings; there is no apparent trend in landings. Similarly in the Commonwealth of the Northern Mariana Islands, mahimahi landings decreased from record levels in 1988 to 5,900 pounds or 50% of the PMUS landings in 1989; no trend is apparent. In American Samoa, mahimahi landings declined somewhat in 1989 to 3,000 pounds or 16% of the PMUS landings but have fluctuated widely without apparent trend.

12. Wahoo landings in Hawaii (348,000 pounds) rank last among the PMUS where they account for only 7% of the commercial landings. The total Hawaii landings of wahoo have been rather stable, but troll and handline landings have declined while longline catches have increased. In Guam, wahoo landings were up slightly from 1988 as part of what appears to be a generally increasing trend. In the Commonwealth of the Northern Mariana Islands, wahoo landings decreased markedly in 1989 to 1,300 pounds or 11% of the PMUS landings, but otherwise show not trend. In American Samoa, wahoo landings increased slightly to 1,400 pounds, or 7% of the PMUS landings, but show no trend and little variation.

13. Shark landings are generally small or are not recorded since there is little commercial or sport fishing interest in sharks compared to the other PMUS species. However, in American Samoa, shark landings in 1989 amounted to 22% of the PMUS landings. Sharks are also gaining increasing acceptance in Hawaii markets for fresh fish and in the recreational fisheries.

14. Troll fisheries dominate the domestic fisheries in American Samoa, Guam and the Commonwealth of the Northern Mariana Islands in contrast to Hawaii where longline vessels now dominate in the harvesting of PMUS and tunas. Only one domestic longline boat operated out of the Marianas, and pelagic

handline fishing has not yet become established in any American Pacific islands other than in Hawaii.

15. The foreign longline fleet, based in Guam but primarily fishing in the waters of the Federated States of Micronesia, has now increased to 160 boats with landings of 26-33 million pounds of tuna and billfish during 1988-89. This is two to three times the landings of the Hawaii longline fleet.

16. The number of foreign longliners based in American Samoa, but not fishing in the EEZ, increased from 128 vessels in 1987 to 143 in 1988. Total landings decreased from 37,800 mt in 1987 to 24,400 in 1988. PMUS landings decreased 43% to 1,800 mt or 7.4% of total landings. Billfish, consisting mostly of blue marlin, made up 2/3 of the PMUS landings.

17. The inflation adjusted ex-vessel price of pelagic species has increase slightly from 1987 to 1989 in Hawaii while inflation adjusted revenue (defined as the total revenue for trips with landings of PMUS) jumped from 1987 to 1988 and increased again in 1989. In contrast to this situation in Hawaii, the economic climate in the other island areas is less conducive to development or continued health of the pelagic industry. In Guam, while revenue (not inflation adjusted) has increased steadily through 1989, inflation adjusted price for PMUS declined steadily through 1989. Also, unadjusted revenue per trip for PMUS and all pelagics went up in 1989, but either showed no trend over time or declined slightly. In the Commonwealth of the Northern Mariana Islands, total revenue (unadjusted) per trip and inflation adjusted price for PMUS has remained relatively steady since 1987. In American Samoa, revenue (unadjusted) is down in 1989 from 1988 and from the high in 1985, revenue (unadjusted) per trip for PMUS and all pelagics show a downward trend since 1985 and 1983, respectively, and inflation adjusted price of PMUS shows no trend.

18. Fishing effort for pelagic species has generally increased in all island areas. In Hawaii, the number of longline vessels has increased substantially from 37 in 1983 to 80 in 1989. In Guam, while the number of trips and hours fished decreased slightly from 1988 to 1989, the there appears to be a slight upward trend in each series. In American Samoa, the number of trips and hours fished show a fluctuating but increasing trend since 1982. Only in the Commonwealth of the Northern Mariana Islands does the number of trips and fishermen show a declining trend.

19. Recent data on fishing effort and catches of pelagic species made in the EEZ of Johnston Atoll, Wake Island, Kingman Reef, Palmyra Island, Howland Island, Baker Island, and Jarvis Island are not available. In 1989, no fishing permits to fish in the U.S. EEZ of the Western Pacific region were requested by any

foreign country. Pole-and-line (skipjack tuna) vessels and purse seiners are not subject to any permit or reporting requirements under the present U.S. tuna policy. Between 1982-84, the annual average catch of skipjack tuna by Japanese pole-and-line vessels in the U.S. EEZ of the Western Pacific region was nearly 43 million pounds. Less than one percent of the catch of Japanese pole-and-line vessels were non-tuna species. Data is not available on catches of Japanese pole-and-line vessels for recent years. No information is available on fishing by purse seiners, foreign or domestic, in the U.S. EEZ of the Western Pacific region.

PLAN ADMINISTRATION AND ENFORCEMENT ACTIVITIES

The National Marine Fisheries Service (NMFS) Southwest Region and the Fourteenth Coast Guard District provided the following summary of plan administration and enforcement activities. Details of enforcement patrols are periodically provided to the Council by the U.S. Coast Guard and the Law Enforcement Branch of the NMFS. These reports are on file at the Council.

Administrative Activities

No administrative actions relating to foreign fishing within the U.S. EEZ of the Western Pacific region were required in 1989 since no fishing permits were requested by any foreign country under a Governing International Fishery Agreement (GIFA). However, in response to Council's request, NMFS Southwest Region prepared an amendment to the FMP regulations governing domestic pelagic fisheries (Part 685 CFR) by making it a Federal requirement that all catches of billfish and associated species by U.S. vessels be reported to the appropriate state (territorial) agency in compliance with state/territorial laws and regulations. The proposed amendment was submitted to the NOAA Assistant Administrator for Fisheries in March 1990. The intent of this proposed amendment is to better ensure that landings of pelagic species by domestic fishermen are reported in a timely and accurate manner.

Enforcement Activities

In 1989, U.S. Coast Guard C-130 aircraft logged 139.0 hours on foreign fisheries patrols compared to 171.4 hours in 1988. Patrolled areas include the main Hawaiian islands, Northwest Hawaiian Islands, Guam, Northern Marianas Islands, Johnston Island and Wake Island. For all of 1989, a total of 18 foreign fishing vessels were sighted. No violations were observed.

Several reports of illegal fishing in the EEZ by foreign longline vessels were received by Honolulu enforcement offices. The Coast Guard responded to all reports with negative results.

Twenty-four foreign longliners were boarded and inspected in Honolulu Harbor during 1989.

The Council requested the Secretary of Transportation to increase by threefold the budget presently available to the Fourteenth Coast Guard District for enforcing federal fishery regulations. The Council was advised that additional time for fisheries patrols was simply not possible unless additional aircraft and ships can be acquired. While the fiscal year 1990 budget does not have funding specifically targeted in

support of the Fourteenth Coast Guard District's fisheries law enforcement, there is funding for enhanced sensors for Coast Guard aircraft and increased maintenance support for aircraft. Because of the multi-mission nature of the Coast Guard's law enforcement resources (e.g. drugs, pollution, marine safety, vessel inspection), it is possible to change the emphasis of patrols. During 1989, the Commandant of the Coast Guard directed is Area Commanders to place a greater emphasis on fisheries.

Habitat of the Management Unit Species

At the present time, there is no information to suggest that the pelagic habitat of the management unit species was subjected to major alterations or modifications in 1989. However, continued introduction of low level pollution sources, with occasional pulses of substantially larger levels, is an ongoing problem with unknown impacts on management unit species, particularly at the egg and larval stages. Pollutants impact the pelagic habitat from both point and non-point sources. Pollution sources include run-off from high islands, sewage from deep ocean outfalls and ships at sea, oil from bilges and accidental spills, and marine debris drifting into the western Pacific region or directly introduced into the habitat by vessels.

During March 1989 there were two medium oil spills in the Hawaiian Islands; 1) the March 2-3 spill of approximately 30,000 gallons of bunker C and North Slope crude from the vessel EXXON HOUSTON at Barbers Point, Oahu and; 2) the appearance of at least 10,000 gallons of an unknown product from an unknown source on the south shore of Molokai, the north and east shore of Lanai and the interisland channels. NMFS was involved in monitoring impacts from both spills via CG helicopter and shoreline/underwater surveys. The only detectable impacts were to nearshore species with no apparent direct effect to management unit species.

During 1989 the joint Federal-State of Hawaii Task Force established in 1984 continued working on the Final Environmental Impact Statement (EIS), "Proposed Marine Mineral Lease Sale, Exclusive Economic Zone Adjacent to Hawaii and Johnston Island." Potential impacts to management unit species and their habitat, as well as fisheries targeting these species, have been addressed in the EIS. The release of the Final EIS has been delayed and is now scheduled for mid-1990.

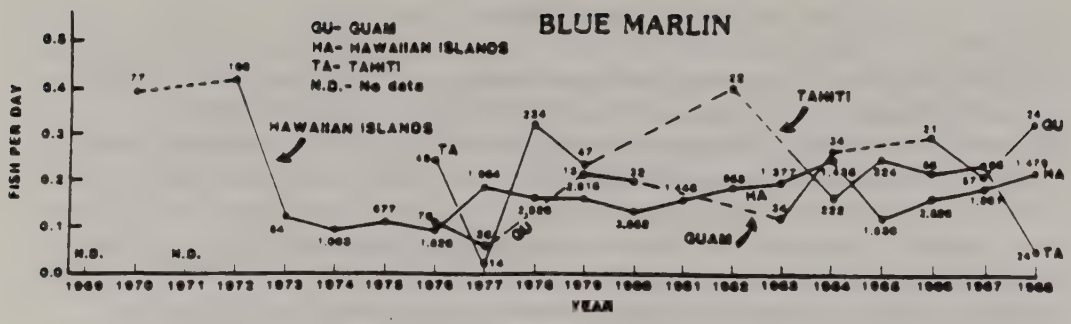
In American Samoa, work continued through 1989 on the authorization of EPA Ocean Dumping Permits for the Starkist and Van Camp canneries to dispose of fish processing wastes. Both NMFS and the Council recommended the ocean dumping site be moved to the offshore alternative (Dumpsite D in 1,500 fathoms) and that a monitoring program be established to determine the potential for adverse impacts in the area of the new dumpsite. EPA has agreed with these recommendations and has issued permits with monitoring stipulations for the offshore site.

RESEARCH

1. Kim Holland from the Hawaii Institute of Marine Biology and Richard Brill from the Honolulu Laboratory of the NMFS tracked six blue marlin in Hawaiian waters for durations between 7 and 42 hours. The fish were tagged with ultrasonic transmitters which made it possible to track the horizontal and vertical movements of all six fish. Immediately upon release, all of the fish dove into the upper layers of the thermocline where they remained for 4 to 6 hours. Also, all of the fish initially headed directly offshore for several hours, and their swimming speed during these first few hours was greater than during the remainder of the tracks. None of the fish demonstrated a patrolling of a "home territory" behavioral pattern. Pooling the data from all six fish indicates that about 36 percent of the daytime and 60 percent of the nighttime was spend within 33 yards of the surface, the rest of the time being deeper. There was no indication that any of these fish suffered permanent damage from the trauma of capture and release, even though some of them appeared to be completely exhausted at the time the transmitter was attached. Recovery time appeared to be between 4 and 6 hours.

2. Oscar Sosa-Nishizaki and Makoto Shimizu from the University of Tokyo have identified four areas in the Pacific with a periodic concentration of sexually mature swordfish: the equatorial area, the central north Pacific (waters around Hawaii), the Coral Sea, and the area between 10°S and 30°S and west of 110°W. In the equatorial area, mature swordfish females were present in all the months, but the number was comparatively low. Mature specimens were remarkably present around Hawaiian waters during the April to July period. In the Coral Sea, the concentrations of mature females was high during the November-February period.

3. James Squire from the La Jolla Laboratory of the NMFS has undertaken the Pacific International Billfish Angler Survey since 1969. The catch rate for blue marlin (following page) was determined from information provided by anglers responding to the Survey.



CPUE (number of fish/angler day) for blue marlin and number of angler days reported fishing in important catch areas, 1969-1988.

4. Robert A. Skillman and Reese Tokunaga from the Honolulu Laboratory established a microcomputer data base consisting of size data for pelagic species. The purpose of the data base is to facilitate population dynamics research using size-based methods as well as the development and utilization of fishery indicators. Several data sets pertaining to the Hawaii fishery and one for the Samoa fishery were put into the data base. However, not all of the important data bases were included nor was a graphing facility incorporated.

5. Samuel G. Pooley from the Honolulu Laboratory reported the following research topics underway during 1989:

   a. Hawaii recreational billfish economic study

      (1) The purpose of this project is to estimate the non-market economic value of billfish in Hawaii, with specific application to the current longliner-troller interaction problem.

      (2) The project will utilize the prevailing "willingness to pay" methodology to estimate non-market valuations.

      (3) The project is designed on collaboration with the University of Hawaii's Department of Agricultural and Resource Economics.

   b. Hawaii longline cost-earnings study

      This study is designed to provide information on the operating costs of longline fishing vessels operating from Honolulu. The study is similar to previous projects concentrating on the NWHI lobster fleet and the

NWHI bottom fishing fleet. Results from the study probably will not be available until 1991.

c. Guam longline economics study

The purpose of this project was to evaluate the dynamics and potential economic impacts of potential regulatory actions concerning foreign (and perhaps domestic) longline fishing operations in Guam. The project was intended to be in collaboration with the South Pacific Commission and the Government of Guam. Preliminary data acquisition by those organizations has just begun, and the economic component of the project will be delayed until adequate fishing operations data are obtained and an on-site researcher is available.

d. American Samoa, Guam, and Northern Mariana Islands small boat economics study

This study is to develop baseline information on the economics of small boat fishing in these areas. The study was initiated with a collaborative survey of small boat owners conducted by the fisheries offices in each area. The data were reported by Kasaoka in 1989, but resources for completing the economic portion of the study have not been available.

e. Hawaii seafood market channel survey

This survey is designed to provide statistically-reliable estimates of seafood product flow at the wholesale and retail level in Hawaii. Market channel data provide three key pieces of information: 1) the relationship between existing samples of Hawaii fishery landings and the total volume of Hawaii fishery landings; (2) the volume of Hawaii seafood imports and exports; and 3) the relationship between local landings and total market volume. The survey will also provide important economic information on the evolving structure of Hawaii's seafood markets including growing markets for PMUS. The survey was planned for 1989, but because of contracting and survey approval problems, it was deferred to 1990. A pre-test was conducted by NMFS technicians during the first half of 1990, and survey approval will be sought for 1991 fielding of the survey.

f. Linear programming models of Hawaii's commercial fisheries

A series of simulations of the economics of Hawaii fishing fleet operations have been conducted over the past several years. The purpose for these models, termed linear programming models, was to develop a

tool for evaluating in a qualitative manner the effect of various regulatory and exogenous changes on fleet operations. The most recent version (Kasaoka, 1990 models 5 categories of fishing vessels fishing for 5 main species groups (bottomfish, PMUS, lobster, aku, and ahi). The methodology follows that applied in the west coast groundfish fishery, and extension of the Hawaii model to non-linear estimation is a possibility. A critique of these models and methodologies has just been completed by two colleagues at the University of Hawaii (Miklius 1990) which proposes increased attention be paid to the incentives and behaviors of fishing vessel owners and captains using a utility model. This report may identify alternative methods for future research.

g. Hawaii longline fishery update

This report will update "Status of the tuna longline fishery in Hawaii, 1987-88" prepared in 1989 by Kawamoto, Ito, Clarke and Chun. The purpose of the report is to investigate the differences in operating patterns and catch composition by different longline gears: basket, bin, monofilament, and monofilament with line shooters. The report should be completed by December 1990.

h. Status of Hawaii's swordfish fishery operations

The purpose of this report is to identify the operating characteristics of Hawaii's emerging swordfish (broadbill) fishery, with an emphasis on vessel and gear configurations, fleet composition, and fishing patterns. This report is also scheduled for completion by December 1990.

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Holland, K. N., et. al. 1990. Behavior and Vertical Distribution of Pacific Blue Marlin in Hawaiian Waters as Determined by Ultrasonic Telemetry. In Proceedings of the 41st Annual Tuna Conference. Christopher H. Boggs (ed), Southwest Fisheries Center Administrative Report H-90-07, 89p.

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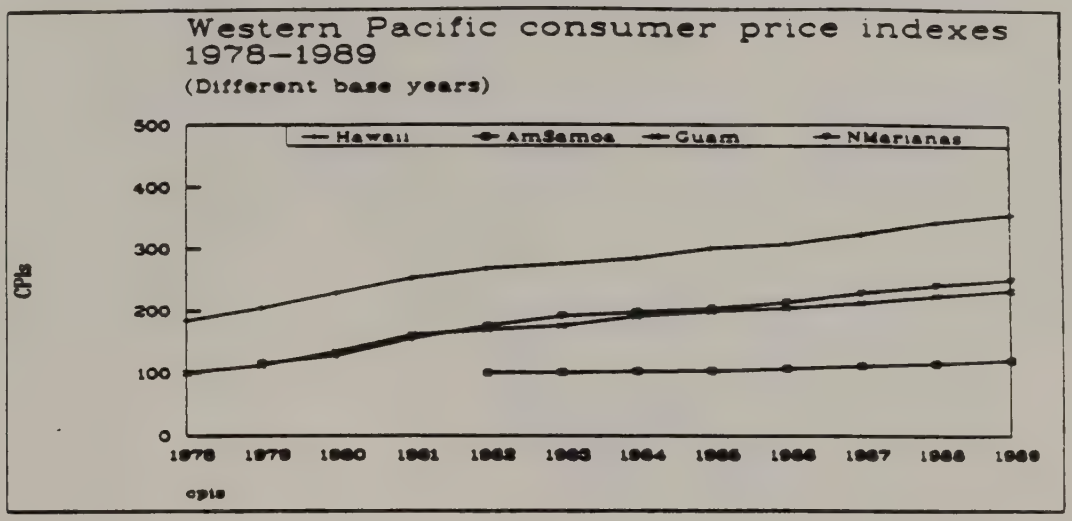
APPENDIX

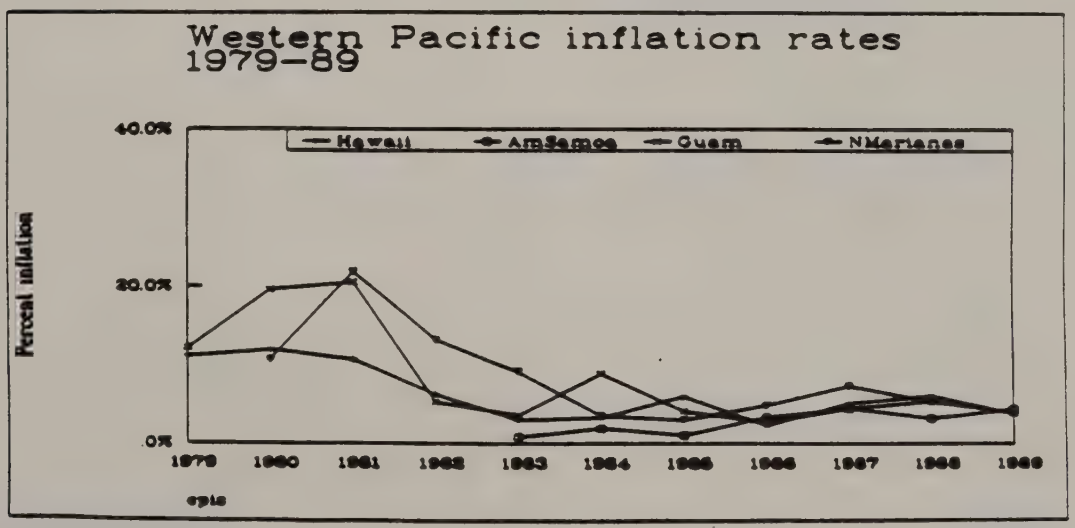
FISHERY PERFORMANCE DATA AND INDICATORS

ALL AREAS

Two figures to assist in evaluating fishery performance data for all of the island areas are presented below.

FIGURE 1
WESTERN PACIFIC CONSUMER PRICE INDEXES AND INFLATION RATES





HAWAII

Standard fishery performance figures and a table for the Hawaii fishery are presented on the next several pages.

The sources of the data are identified on each table and figure.

TABLE 1

Species Composition of Commercial Landings[1] (in 1,000 pounds)
of Longliners and Trollers and Handline Fishermen in Hawaii, 1987-1989

Species Category	Longline						Troll & Handline Combined					
	1987	(%)	1988	(%)	1989	(%)	1987	(%)	1988	(%)	1989	(%)
Tunas												
Bigeye Tuna	1,793	(46)	2,738	(41)	3,137	(32)	96	(2)	321	(6)	456	(14)
Yellowfin Tuna	583	(15)	1,312	(19)	2,160	(22)	2,741	(52)	2,382	(47)	772	(23)
Albacore Tuna	328	(9)	678	(10)	552	(6)	9	(*)	27	(1)	21	(1)
Skipjack Tuna	3	(*)	15	(*)	19	(*)	209	(4)	366	(7)	321	(9)
Other Tunas[2]	0	(0)	0	(0)	0	(0)	11	(*)	6	(*)	6	(*)
Total Tunas	2,707	(70)	4,743	(70)	5,868	(60)	3,066	(58)	3,102	(61)	1,576	(47)
Other Pelagics												
Blue Marlin	112	(3)	226	(3)	765	(8)	836	(16)	794	(16)	764	(22)
Striped Marlin	598	(15)	1,112	(17)	1,340	(14)	93	(2)	235	(4)	128	(4)
Other Billfish[3]	152	(4)	205	(3)	910	(9)	55	(1)	137	(3)	75	(2)
Mahimahi	46	(1)	39	(1)	178	(1)	956	(18)	518	(10)	639	(19)
Ono (Wahoo)	53	(1)	90	(1)	203	(2)	265	(5)	247	(5)	145	(4)
Other[4]	225	(6)	319	(5)	576	(6)	5	(*)	32	(1)	62	(2)
Total Other Pelagics	1,186	(30)	1,991	(30)	3,972	(40)	2,210	(42)	1,963	(39)	1,813	(53)
GRAND TOTAL	3,898	(100)	6,734	(100)	9,840	(100)	5,276	(100)	5,065	(100)	3,389	(100)
Percent Change from Previous Year			+73%		+46%				-4%		-33%	

[1]Estimates are based on the shoreside sampling monitoring program of the National Marine Fisheries Service. Monitored annual landings were raised to account for days not sampled. Raised landings estimates were expanded depending on the coverage of the fishery by gear type.

[2]Mostly Kawakawa and Keokeo (Frigate Mackerel).

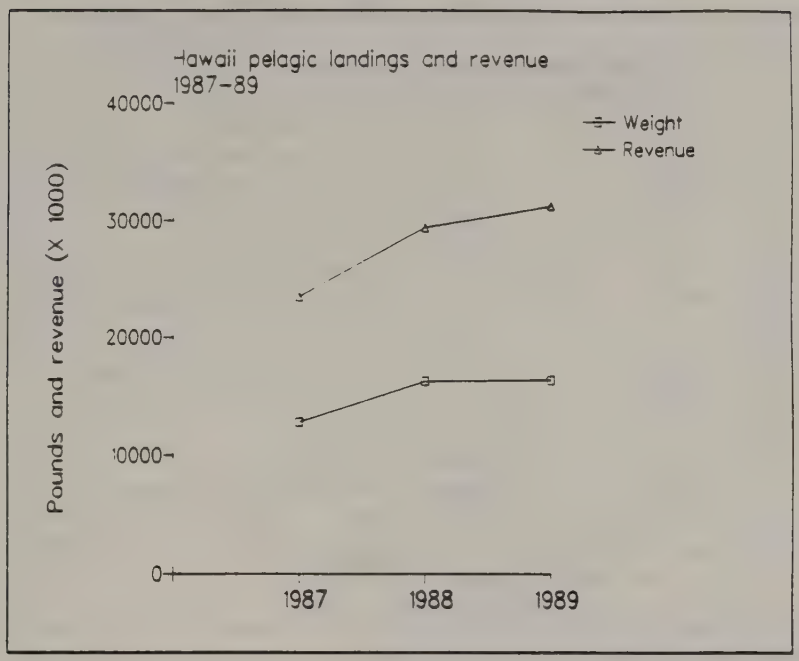
[3]Swordfish, Black Marlin, Spearfish, Sailfish.

[4]Opah (Moonfish), Barracuda, Pomfret, Walu (Oilfish), etc.

* Less than 0.5%

PELTAB1.69/JM1

FIGURE 2
HAWAII PELAGIC LANDINGS AND REVENUE, 1987-89



DATA SOURCE:

Landings and revenue data are collected by the Honolulu Laboratory's market monitoring program.

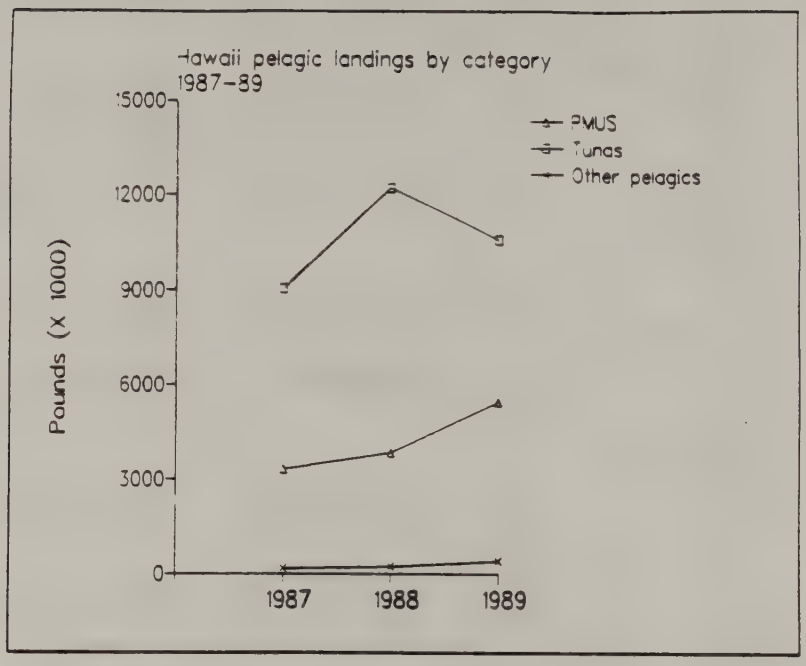
CALCULATIONS AND ADJUSTMENTS:

Actual annual landings and annual revenue data are raised to account for days which were not sampled. Raising landings and revenue values were expanded depending on the coverage of fishery by gear type, i.e. longline, troll and handline etc.

INTERPRETATION:

Pelagic means both PMUS and tunas, including landings of skipjack tuna by the aku boat fleet. The figure shows landings increased 27% from 1987 to 1988 and remaining about the same in 1989. Revenue has increased 33% over the three year period.

FIGURE 3
HAWAII PELAGIC LANDINGS BY CATEGORY, 1987-89



DATA SOURCE:

Landings data are collected by the Honolulu Laboratory's market monitoring program.

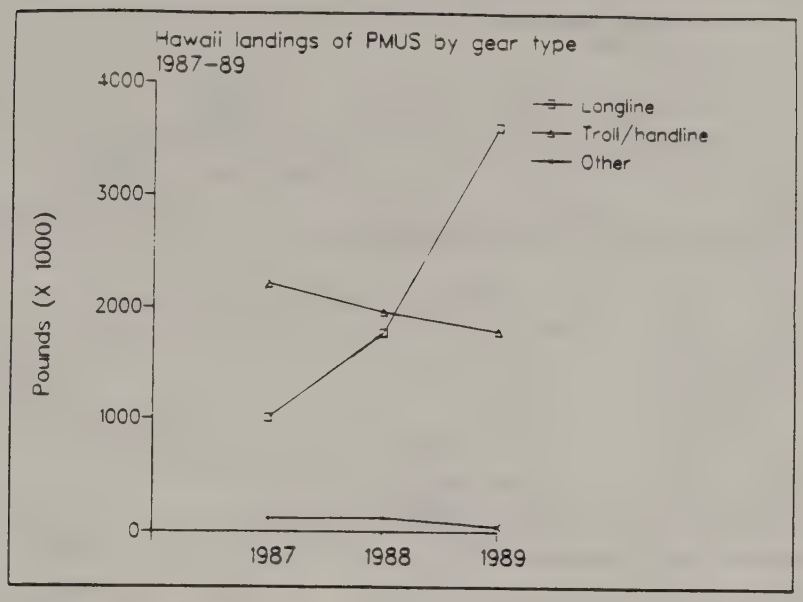
CALCULATIONS AND ADJUSTMENTS:

Landings data were raised to account for days not sampled. Raised landings were expanded depending on the coverage of each fishery by gear type. Individual species were grouped into major categories, i.e. pelagic management unit species (PMUS), tunas, other pelagics:

INTERPRETATION:

The figure shows PMUS landings increased over the three year period while tunas peaked in 1988. Other pelagic landings are very low in comparison to PMUS and tuna landings.

FIGURE 4
HAWAII PELAGIC LANDINGS BY GEAR TYPE, 1987-89



DATA SOURCE:

Landings data were collected by the Honolulu Laboratory's market monitoring program.

CALCULATIONS AND ADJUSTMENTS:

Landings data were raised to account for days not sampled. Raised landings were expanded depending on the coverage of each fishery. Pelagic management unit species (PMUS) landings were grouped into major gear types.

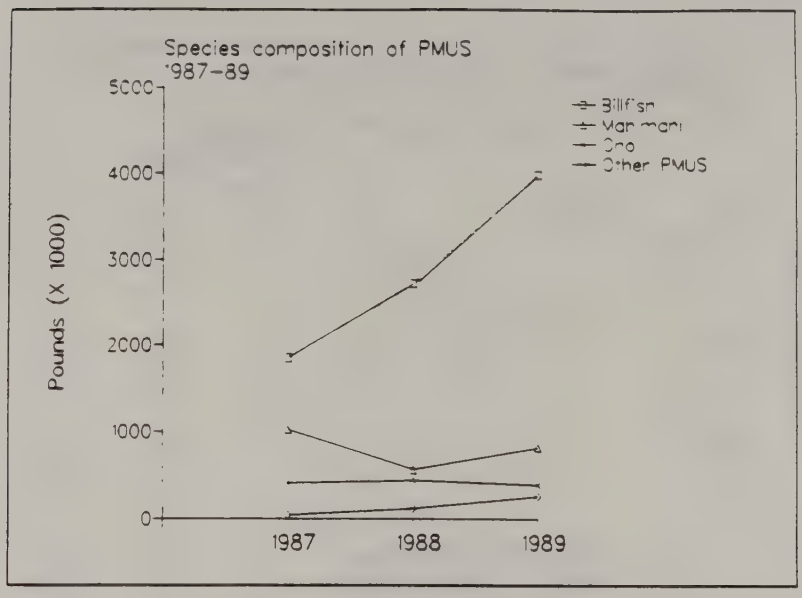
INTERPRETATION:

The figure shows that longline landings of PMUS increased dramatically from 1988 to 1989. Troll and handline landings of PMUS declined slightly during the three year period. Other gear types landed very small amounts of PMUS.

COMMENT:

The longline fleet increased from 50 vessels in 1988 to 80 vessels in 1989. The recent entrants to Hawaii's tuna longline fishery have not set deep for bigeye tuna and, as a consequence, have landed more shallow pelagic species than usual, much of which are PMUS. Also, longliners targeting swordfish added to landings of PMUS.

FIGURE 5
SPECIES COMPOSITION OF PMUS LANDINGS, 1987-88



DATA SOURCE:

Landings data are collected by the Honolulu Laboratory's market monitoring program.

CALCULATIONS AND ADJUSTMENTS:

Pelagic management unit species (PMUS) landings were grouped into major gear types. Landings data were raised to account for days not sampled. Raised landings were expanded depending on the coverage of each fishery. Estimates for each gear type were combined for each PMUS.

INTERPRETATION:

The figure show landings of billfish increasing steadily from 1987 to 1989. Mahimahi was the second most important PMUS landed followed by ono. Landings of other PMUS were small but have increased slightly during the three year period.

COMMENT:

The longline fleet increased from 50 vessels in 1988 to 80 vessels in 1989. The recent entrants to Hawaii's tuna longline fishery did not get the desired depth of set for bigeye tuna and landed more shallow pelagic species than usual, which is the cause for increased landings of billfish. Also, longliners are targeting swordfish.

FIGURE 6
HAWAII PELAGIC FISHERIES FOR 1987-89, ECONOMIC VALUES

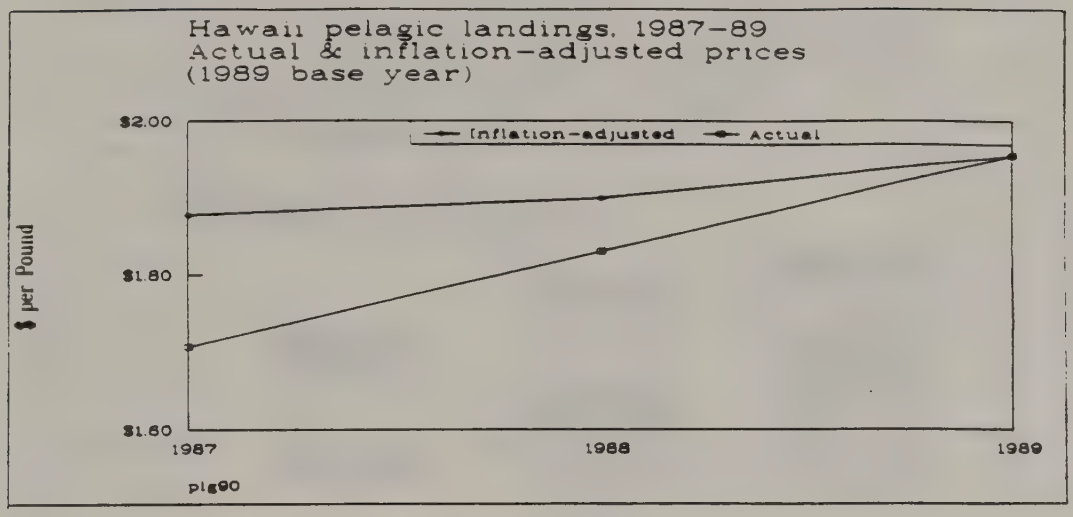


FIGURE 7
SPECIES COMPOSITION OF TUNA LANDINGS, 1987-89

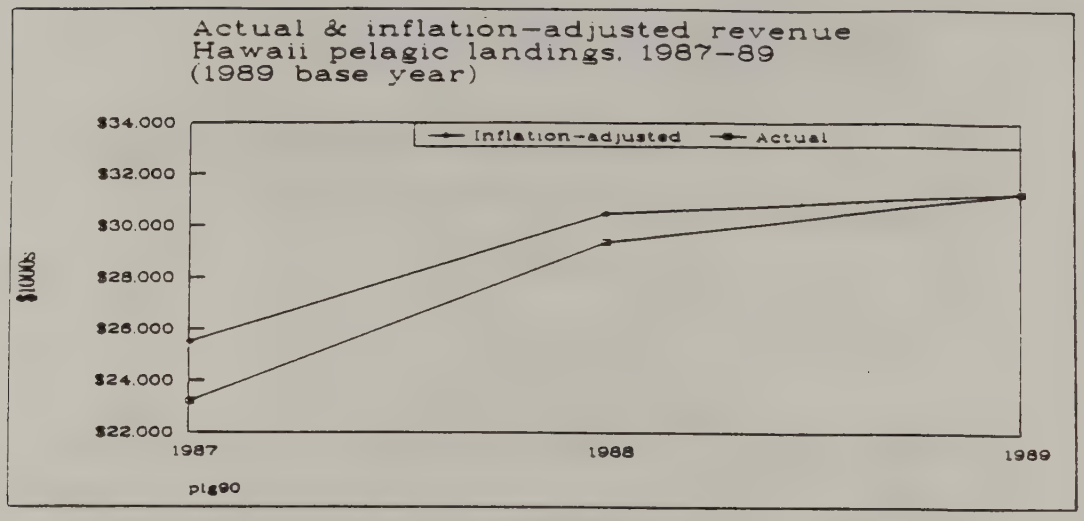
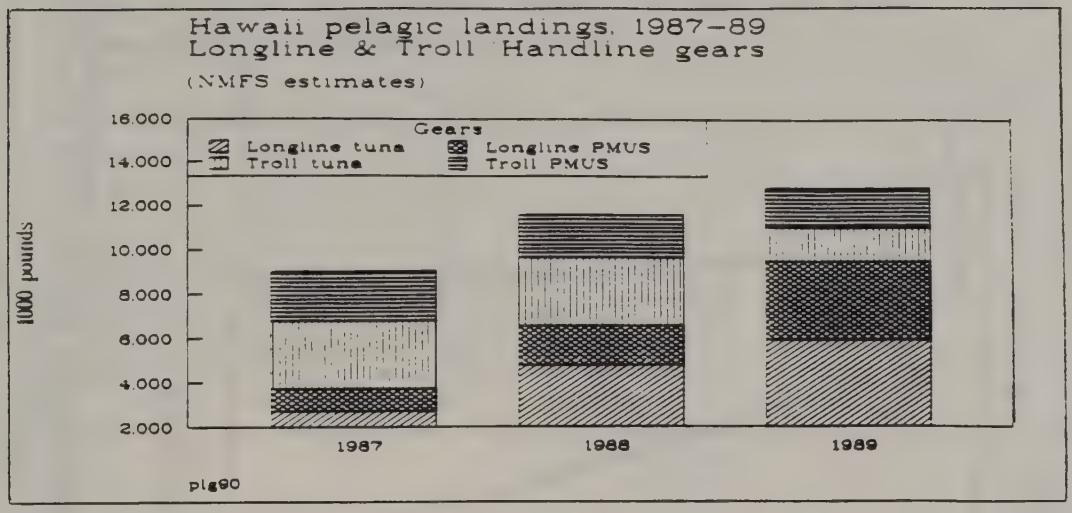


FIGURE 8
HAWAII PELAGIC LANDINGS, 1987-89, LONGLINE & TROLL/HANDLINE GEARS



DATA SOURCE:

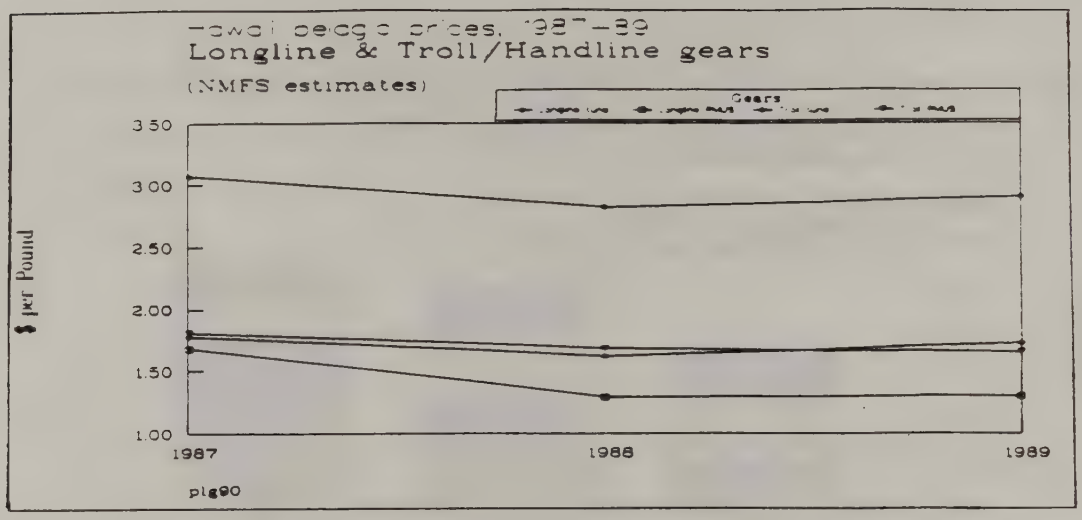
Landings data collected by the Honolulu Laboratory's market monitoring program.

CALCULATIONS:

Actual landings data are raised to account for days and landing sites not sampled.

FIGURE 9

HAWAII PELAGIC PRICES, 1987-89, LONGLINE & TROLL/HANDLINE GEARS



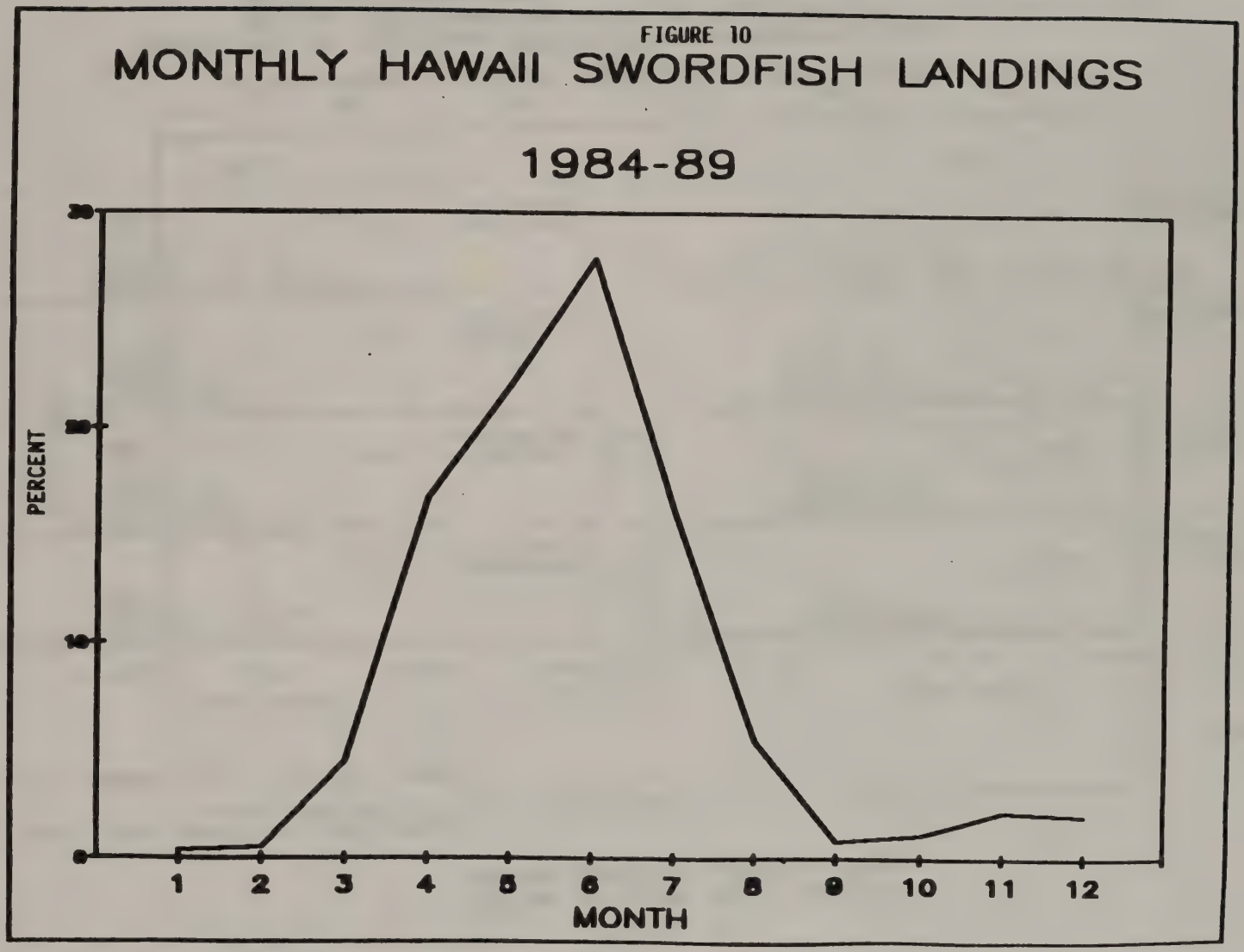
DATA SOURCE:

Price data collected by the Honolulu Laboratory's market monitoring program.

FIGURE 10

MONTHLY HAWAII SWORDFISH LANDINGS

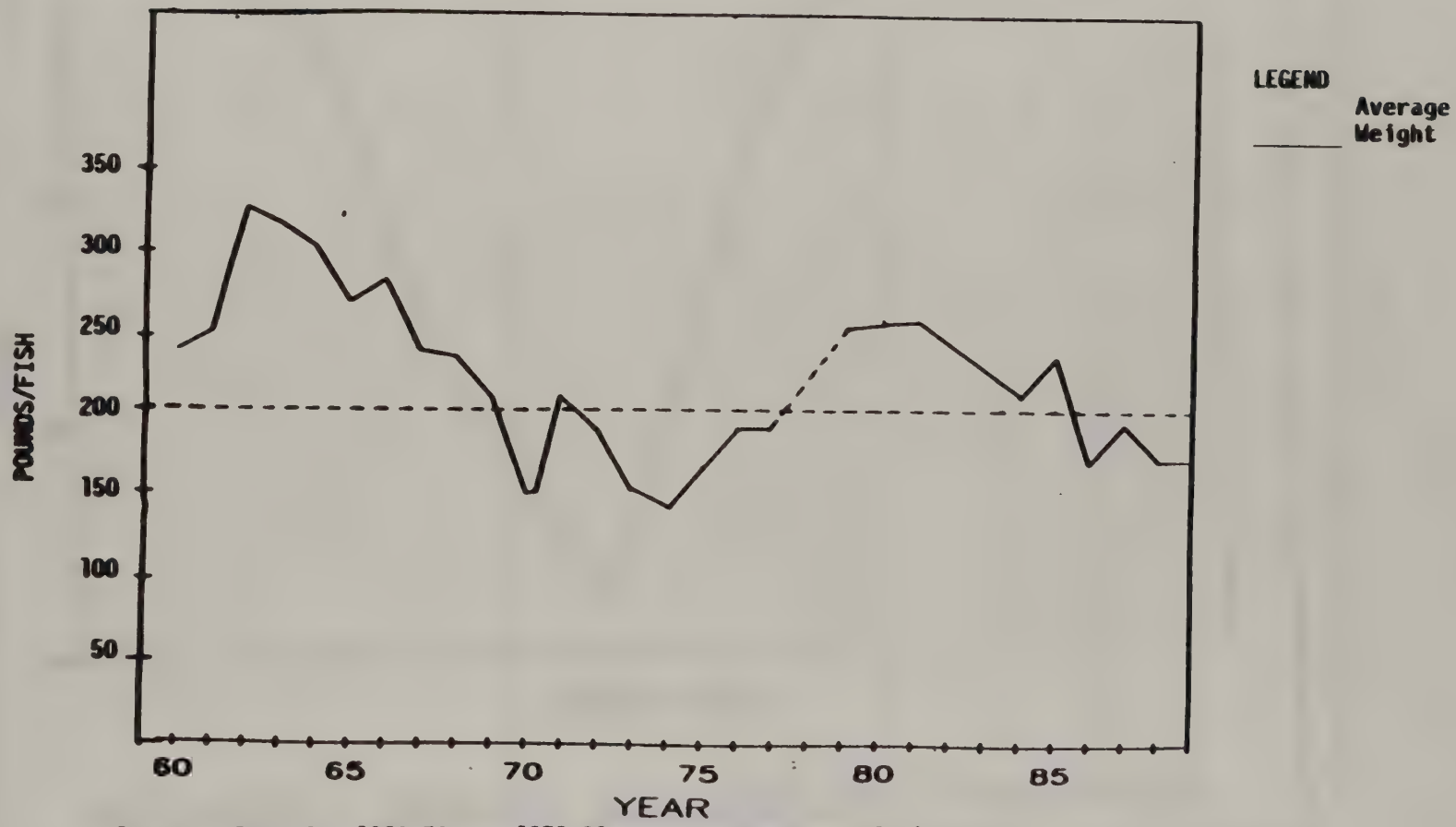
1984-89



SOURCE: Shoreside Monitoring Program of the National Marine Fisheries Service.

FIGURE 11

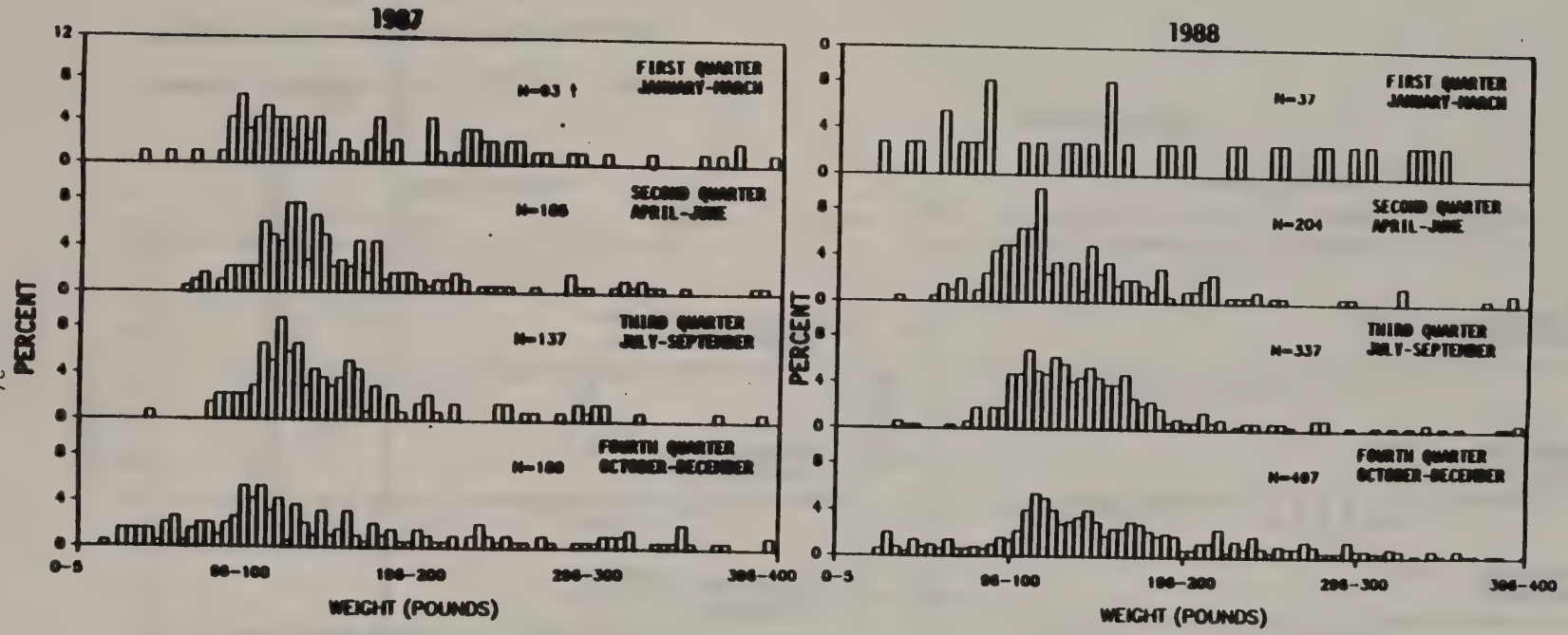
BLUE MARLIN AVERAGE WEIGHT STATISTICS:
HONOLULU COMMERCIAL LANDINGS, 1960-89



Source: Data for 1960-70 and 1979-89 are from the Honolulu Auction.
Data for 1971-77 were supplied by the Hawaii Division of Fish and Game and the United Fishing Agency.

FIGURE 12

WEIGHT FREQUENCY HISTOGRAMS FOR BLUE MARLIN LANDED IN HAWAII, 1987-88

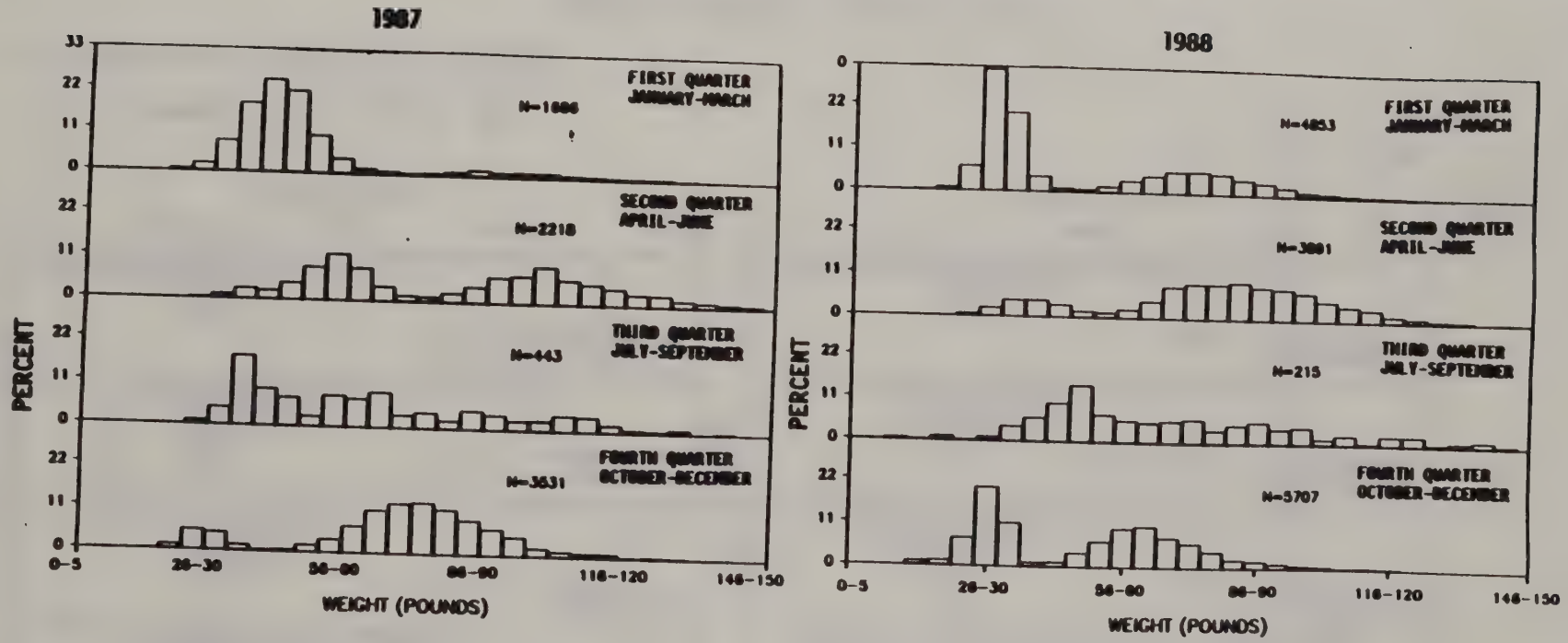


Source: Kawamoto, K.E., et. al. 1989.

N = Sample size (number of fish weighed)

FIGURE 13

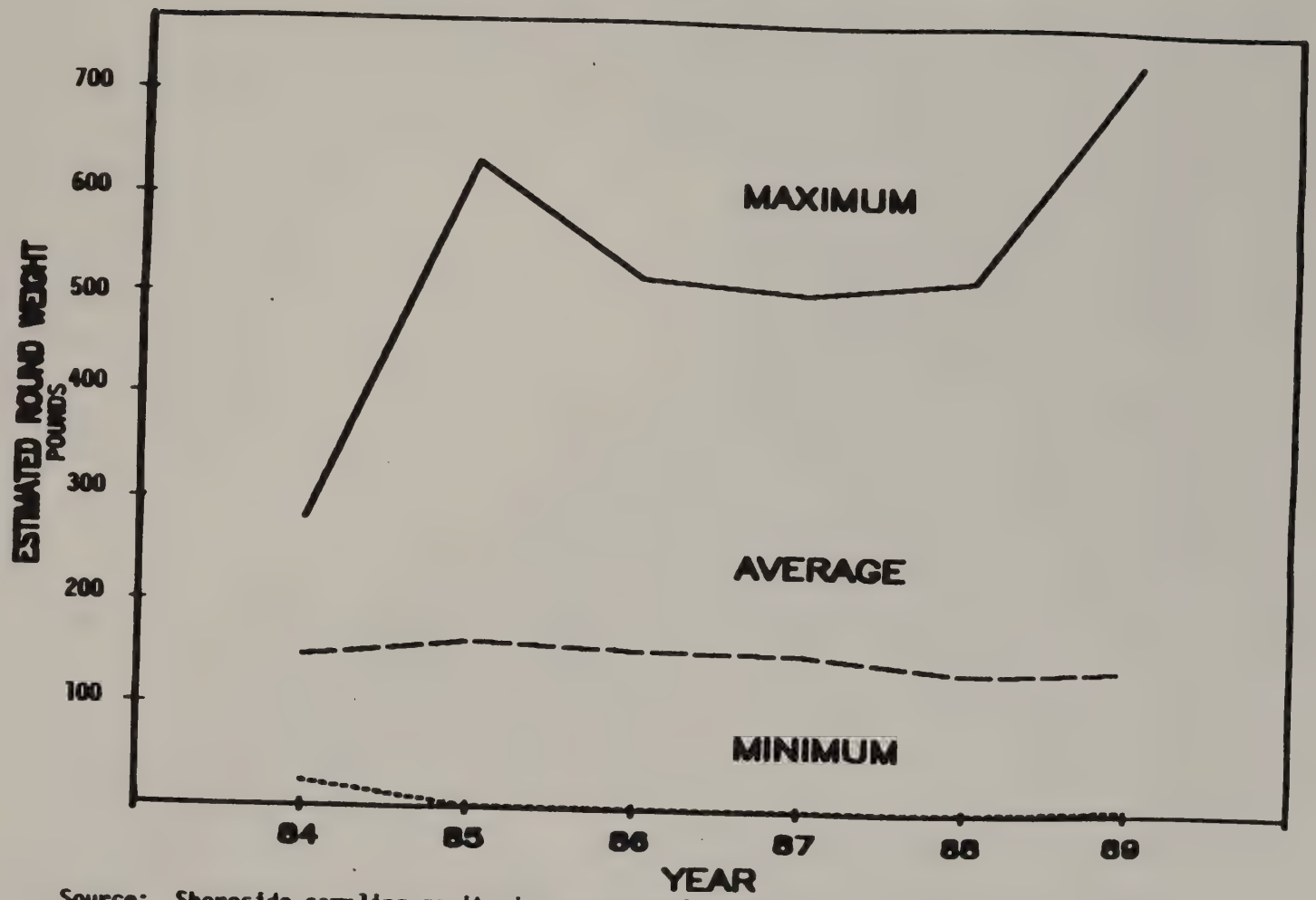
WEIGHT FREQUENCY HISTOGRAMS FOR STRIPED MARLIN LANDED IN HAWAII, 1987-89



Source: Kawamoto, K.E., et. al., 1989

N=Sample size (number of fish weighed)

FIGURE 14
TRENDS IN SIZE OF SWORDFISH LANDED IN HAWAII, 1984-89



Source: Shoreside sampling monitoring program of the National Marine Fisheries Service.

GUAM

Standard fishery performance tables and figures for the Guam fishery are presented on the next several pages.

Table 2

Guam 1989 Creel Survey
Pelagic Species Composition

Species	Pounds
Shark	1,724
Barracudas	13,186
Mahimahi	87,158
Wahoo	111,977
Blue Marlin	109,241
Black Marlin	2,191
Sail	2,141
Rainbow Runner	1,788
Skipjack	130,682
Yellowfin Tuna	34,404
Dogtooth Tuna	5,450
Kawakawa	1,893
Tunas (misc)	45
Pelagic Landings:	501,880
PMUS Landings:	314,432
Tunas Landings:	172,474

Table 3

Guam 1989 Annual Commercial
Average Price of Pelagics

Troll fish	1.75
Barracuda	1.54
Dolphin (mahimahi)	1.60
Marlin	0.89
Sailfish	1.00
Rainbow runner	1.32
Wahoo	1.97
Skipjack tuna	0.95
Dogtooth tuna	1.45
Yellowfin tuna	1.87
Pelagics:	1.31
PMUS:	1.31
Tunas:	1.29

TABLE 4

Catch Comparison for all Guam International or Marianas Fishing Derbies[1].
Weights are Expressed in Pounds (1 kg=2.2 lbs)

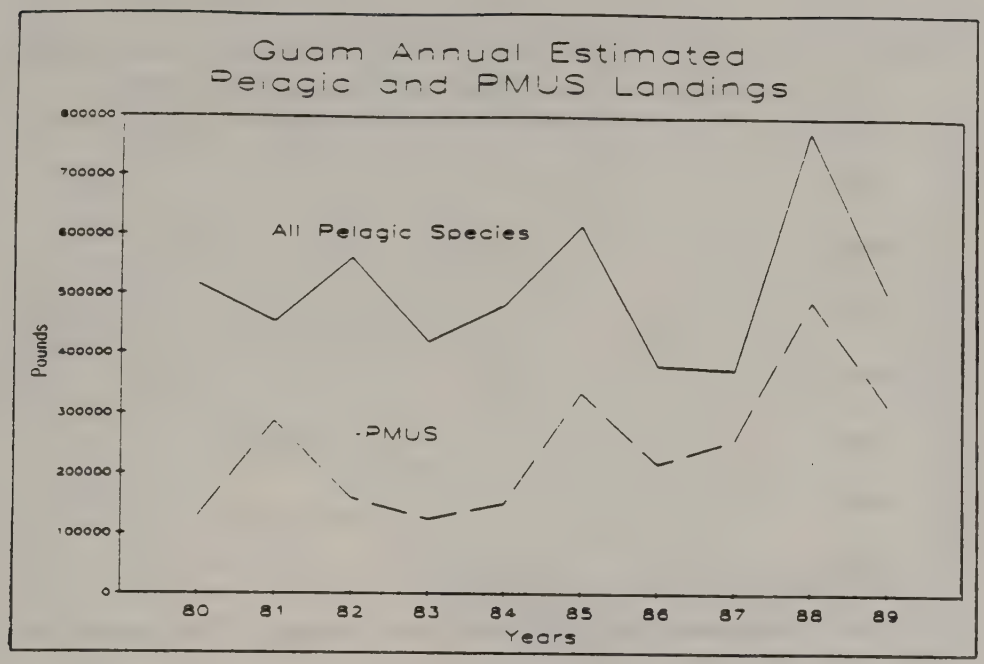
	1977	1978	1979	1980	1981	1982	1983	1984[2]	1985	1986	1987	1988	1989
BLUE MARLIN													
no. caught	9	9	6	12	34	12	13	47	17	47	43	58	86
ave. weight	228	125	258	134	130	157	164	133	215	134	205	146	135
winning fish	423	166	523	306	320	291	436	475	260	383	415	342	402
YELLOWFIN TUNA													
no. caught	18[3]	11	34	50	109	205	100	59	137	71	116	161	81
ave. weight	29	51	41	14	23	26	25	15	17	13	16	12	11
winning fish	102	125	149	113	105	135	123	114	101	101	59	99	47
WAHOO													
no. caught	7	9	11	12	33	60	36	46	98	16	31	72	59
ave. weight	29	25	23	30	36	10	22	22	21	19	22	17	22
winning fish	49	42	43	52	44	50	54	47	52	39	37	49	39
MAHIMAHI													
no. caught	2	4	5	3	1	14	33	0	14	7	3	5	7
ave. weight	15	15	23	29	2	10	13	0	12	19	30	5	12
winning fish	20	20	33	35	2	33	24	0	33	32	34	9	41
DERBY SPECIES													
no. caught	36	33	56	77	177	291	182	152	266	141	193	296	233
total weight	2,817	1,972	3,325	2,724	8,168	7,842	5,786	8,146	5,988	7,636	11,510	11,596	13,831
most per boat											57	42	26
TOTAL CATCH													
no. caught							281	336	427	237	488	993	562
total weight	0	0	0	0	0	0	7,226	9,523	9,634	8,364	14,701	18,052	17,570

[1]Based on returned catch reports for 1977 to 1983, but includes estimated bicatch and unreported catches for 1984 to present. Only the principal derby species are reported for 1977 to 1982.

[2]Based on known catches of principle derby species and estimated catches of non-derby species expanded for non-reporting boats.

[3]Includes all tuna species.

FIGURE 15

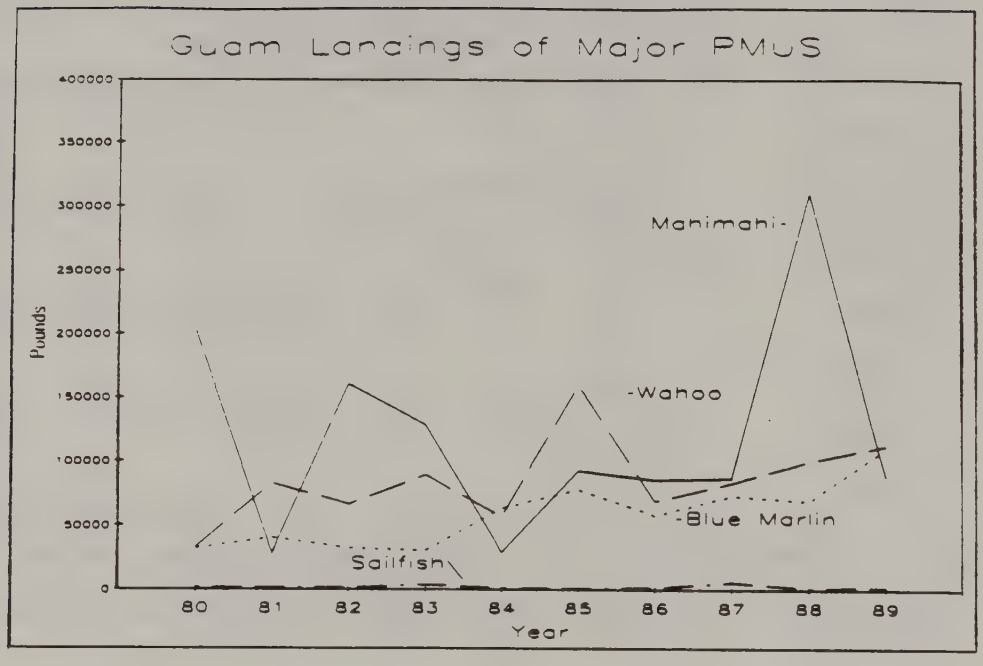


Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculations: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. Percent species composition is calculated by weight for the sampled catch for each method, and then that percentage is multiplied by the expanded catch for that method to produce catch estimates for each species. The annual catch for all pelagic species and the PMUS separately are summed across all methods to obtain the numbers plotted above.

Interpretations: The pelagic fishery is growing in Guam, especially in the last two years as the charter boat fishing industry has begun to flourish. The record high landings in 1988 were due to record high landings of mahimahi as can be seen in the next chart. Virtually all landings are by the trolling method.

FIGURE 16

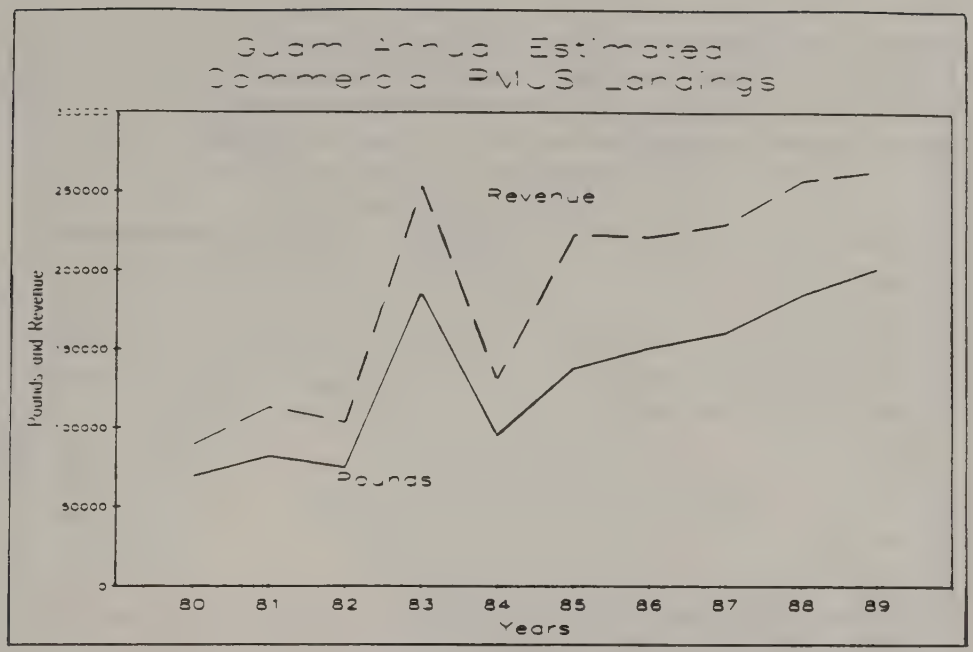


Source: The DAWR offshore creel survey as described for the previous graph.

Calculations: Totals by species are summed across all fishing methods as described in the previous graph.

Interpretations: Record high landings of mahimahi were recorded in 1988 and record high landings of blue marlin were recorded in 1989, most of the fish were fairly small, e.g. around 100-150 pounds. These statements were also true in the CNMI fishery. Wahoo landings continued to increase for the third year in a row, probably because this is a highly targeting species, as is the blue marlin. The actively growing charter fleet undoubtedly added to the increased blue marlin and wahoo landings.

FIGURE 17

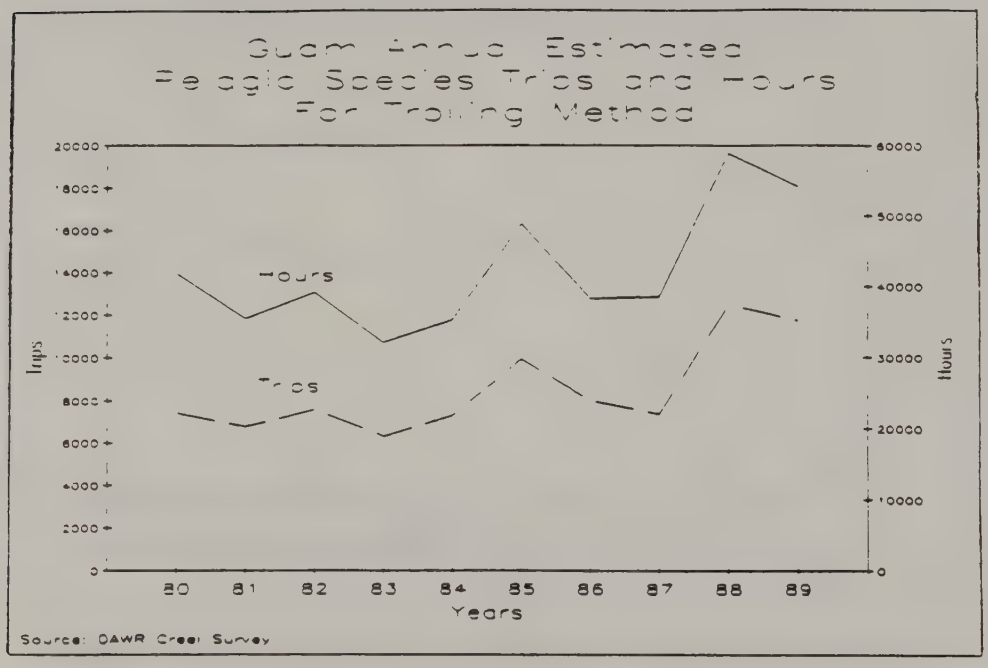


Source: The WPACFIN-sponsored commercial landings data collecting system.

Calculations: The total estimated commercial landings and revenue for each year were calculated by summing the weight and value fields in the commercial landings data base from the principle fish wholesaler on Guam, the Guam Fisherman's Coop, and then multiplying by an estimated percent coverage expansion factor. The annual expansion factor was subjectively created based on as much information as possible depending on the year, including: an analysis of the "disposition of catch" data available from the DAWR offshore creel survey; an evaluation of the fishermen in the fishery and their entry/exit patterns; general "dock side" knowledge of the fishery and the status of the marketing conditions and structure; the overall number of records in the data base; and a certain measure of best guess.

Interpretations: The commercial pelagic fishery appears to be increasing steadily for the last five years. Very few of the fishermen landing fish commercially, however, are full time fishermen. The growing charter boat industry is certainly adding to the growth of the pelagic fishery because nearly all of the charters are for trolling.

FIGURE 18

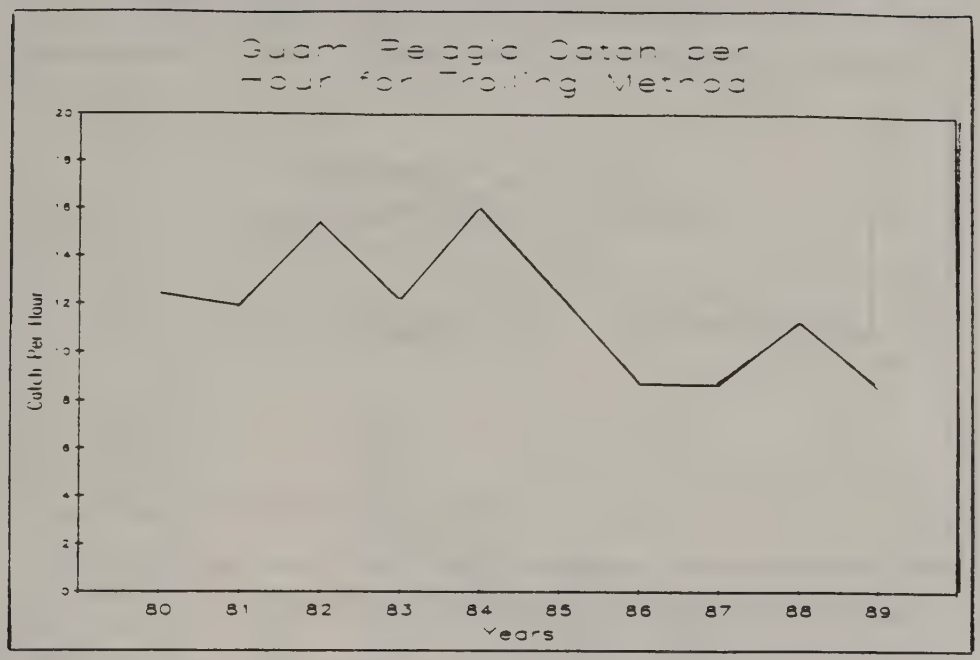


Source: The DAWR offshore creel survey.

Calculations: These plots are of the estimated boat hours and number of trips as taken directly from the creel survey data expansion system printouts for the trolling method.

Interpretations: The pelagic fishery is obviously growing in the level of effort being expended trolling. The record high effort in 1988 was caused partially by the record high abundance of mahimahi around Guam and partially because of a large increase in the charter boat activity which began in earnest that year. The continued high level of activity in 1989 is largely due to the charter fleet and partially due to the record high blue marlin abundance that year.

FIGURE 19

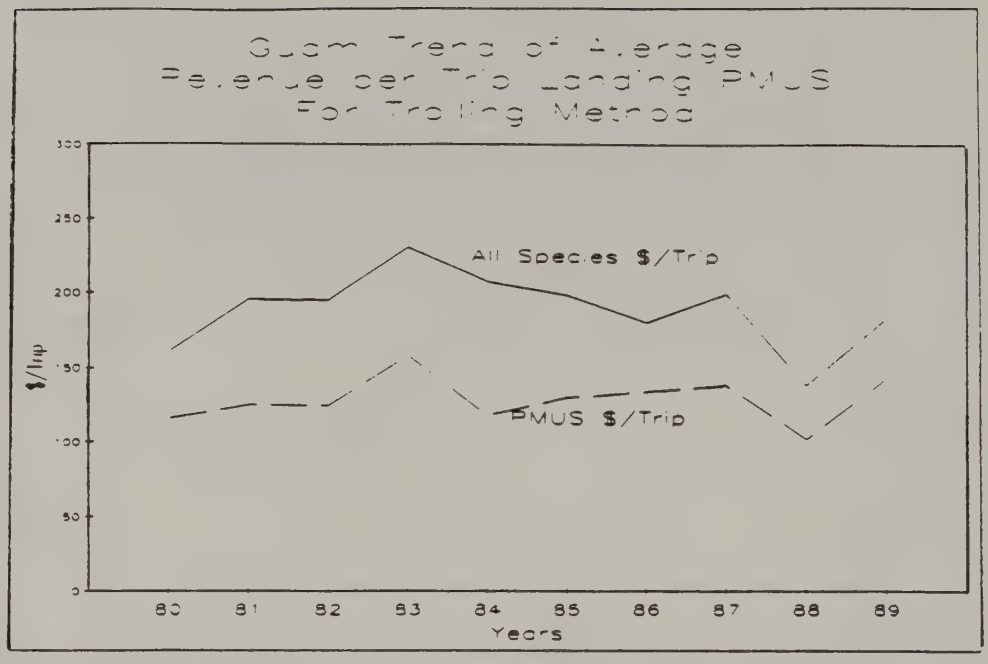


Source: The DAWR offshore creel survey data for the trolling method.

Calculations: The average catch in pounds per hour of trolling was calculated by using each trip as an observation in the calculations. Basically, the sum of the individual trip CPUEs for all surveyed trolling trips was divided by the total number of trolling trips surveyed.

Interpretations: Although both the catch and the effort for the pelagic fishery are increasing, the catch per effort is decreasing. This is not believed to be indicative of a problem in the fishery, but rather a result of the growing charter boat industry. The charter fleet primarily targets people, and catching large quantities of fish is not an important factor in its success. Many more half-day trips are taken than full-day trips, thus reducing the actual fishing time in the more productive waters further off shore.

FIGURE 20

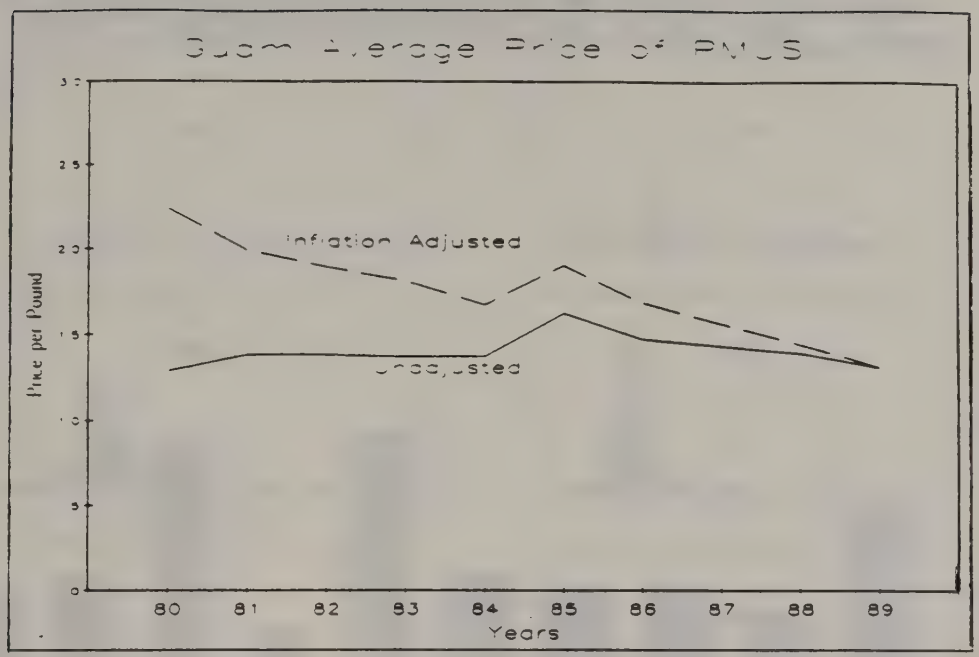


Source: The WPACFIN-sponsored commercial landings system.

Calculations: The average revenue per trip for all species is calculated by summing the revenue of all species sold for any trip which landed any PMUS, and then dividing by the number of trips. The average PMUS revenue per trip is calculated from those same trips by summing the sales of only the PMUS and dividing by the number of trips.

Interpretations: One must be careful in interpreting these data for the Guam fishery because they are subject to biases created by marketing problems and the market structure upon which the data collecting system is based. For instance, 1988 was a record high year for the abundance and landings of mahimahi. One would naturally expect the per trip landings to be high for a year which had record landings. However, because of the glut on the market during the mahimahi season, and because of other marketing problems being encountered by the main wholesaler, the per trip revenue reached an all time low. This was because purchase limits were placed on all fishermen, e.g. only certain fishermen's catches would be purchased (Coop members), and even then a 50 pound maximum limit was placed on mahimahi. This caused fishermen to either stop fishing at all, stop fishing when they caught 50 pounds, or start marketing some of their catches elsewhere, which further increased Coop marketing problems.

FIGURE 21



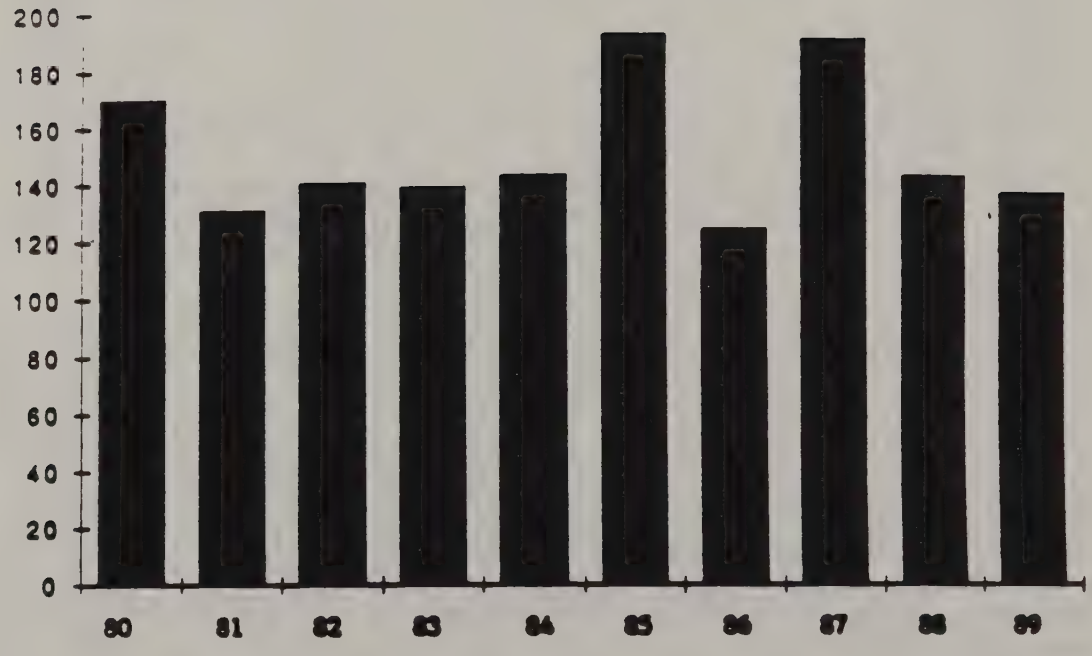
Source: The WPACFIN-sponsored commercial landings system.

Calculations: The average price of the PMUS group is calculated by dividing the total revenue for PMUS by the sold weight. The inflation adjustment is made by using the Consumer Price Index (CPI) for Guam and establishing the 1989 figure as the base from which to calculate expansion factors for all previous years (e.g. divide the 1989 CPI by the CPI for any given year), and then multiplying that factor by the unadjusted average price to obtain the adjusted average price for the given year. The CPI for Guam was not available for 1989, so the relative Hawaii CPI was used to create one for Guam.

Interpretations: Again we must be careful in interpreting these statistics because of the limited data base from which they are taken, but both the unadjusted average price and the inflation adjusted average price show a definitely declining situation for the pelagic fishery for the past four years. This does not promote a healthy atmosphere for a commercial fishery. However, it does not necessary adversely affect the growing charter boat industry since success does not directly depend on the price of fish.

FIGURE 22

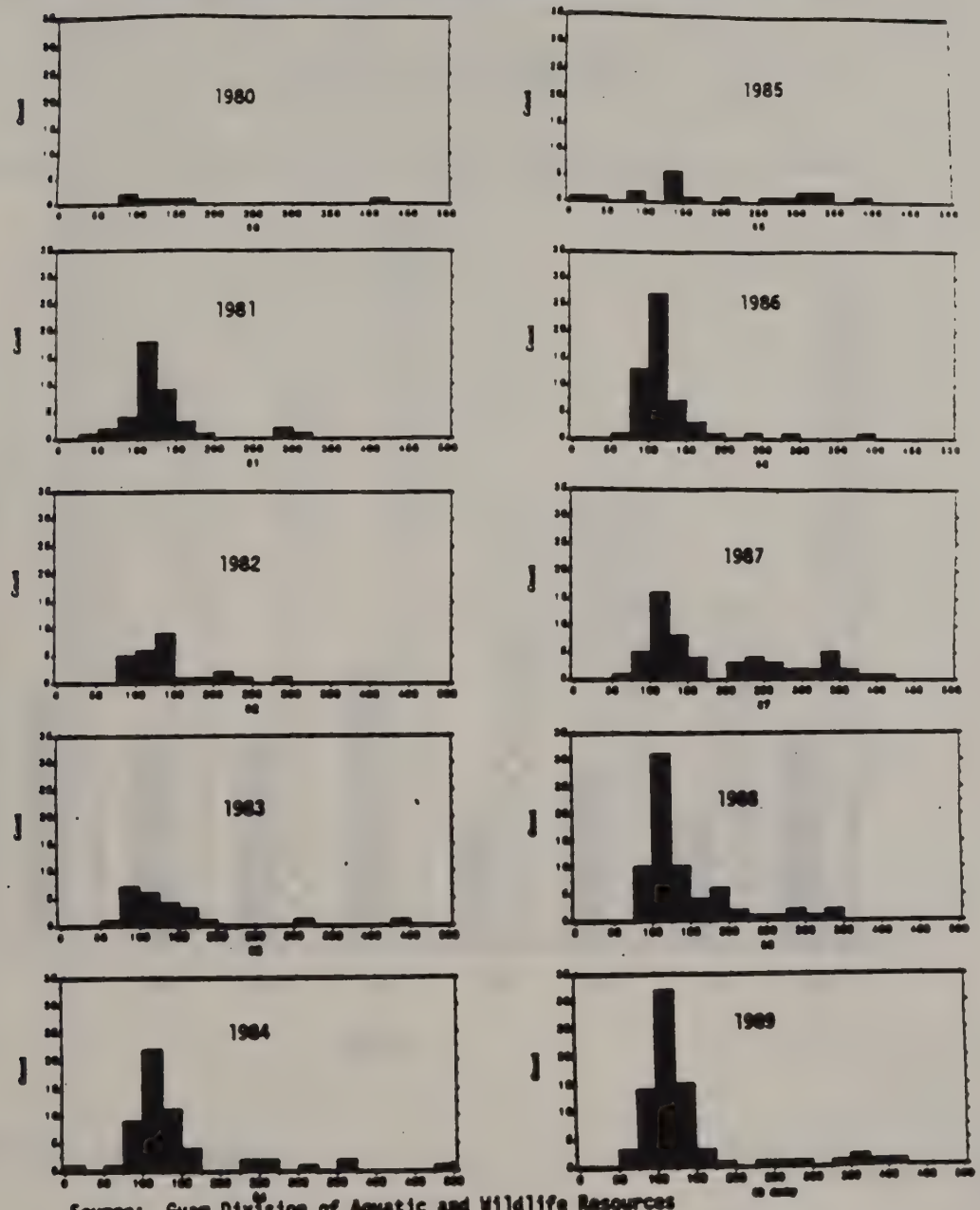
AVERAGE WEIGHT OF BLUE MARLIN SAMPLED DURING THE GUAM OFFSHORE FISHERIES SURVEY AND THE GUAM INTERNATIONAL FISHING DERBY, 1980-89



Source: Guam Division of Aquatic and Wildlife Resources
1980 is based on creel survey data only; 1989 is based on derby data only.

FIGURE 23

WEIGHT-FREQUENCY DISTRIBUTION OF BLUE MARLIN SAMPLED DURING THE GUAM OFFSHORE FISHERIES SURVEY AND THE GUAM INTERNATIONAL FISHING DERBY, 1980-1989. 1989 IS BASED ON DERBY DATA ONLY. WEIGHT IS IN POUNDS.



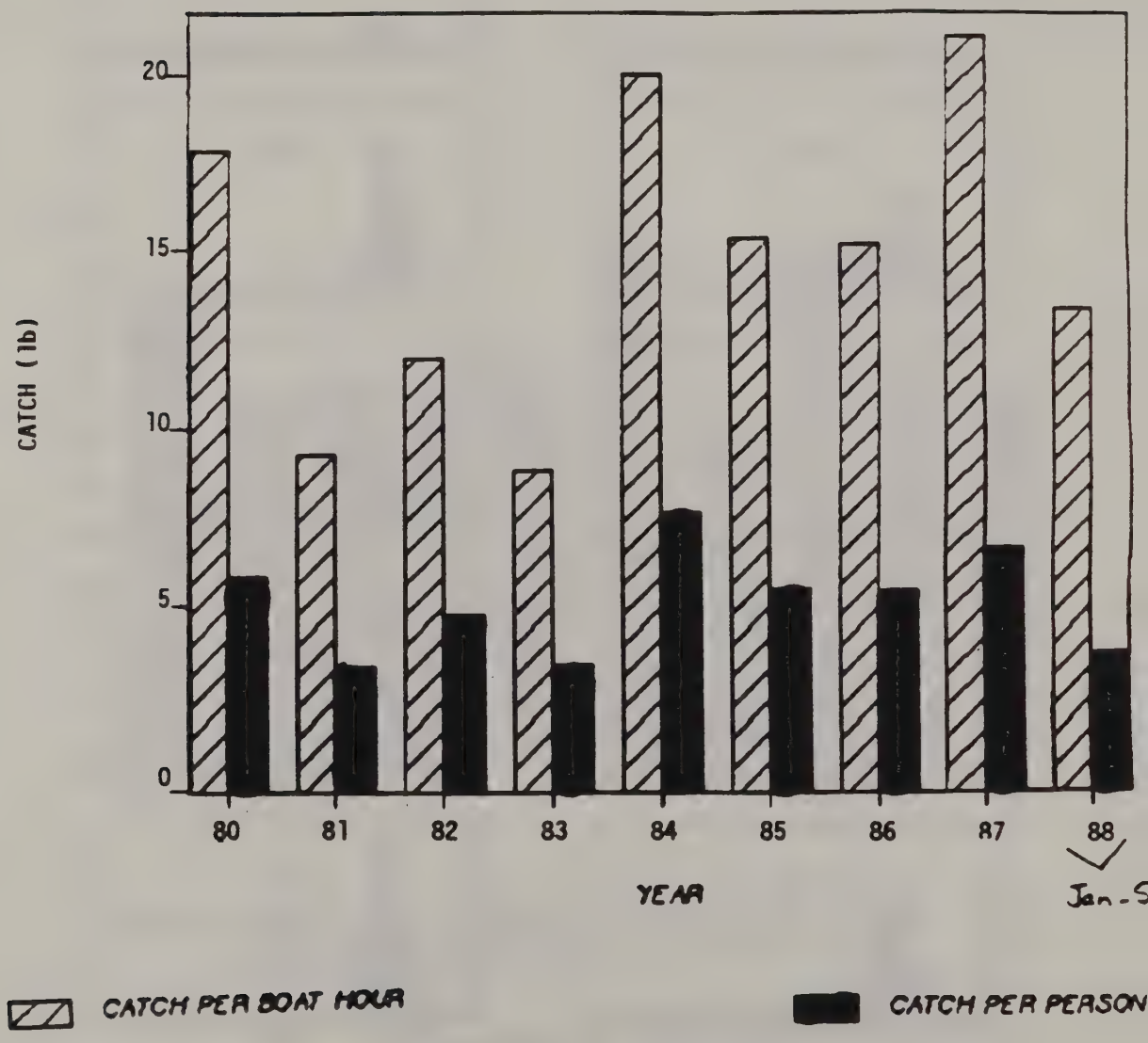
Source: Guam Division of Aquatic and Wildlife Resources

FIGURE 24

MARLIN

CATCH/EFFORT

YEARLY TOTAL



Source: Figure is based on DAWR annual report data.

CNMI

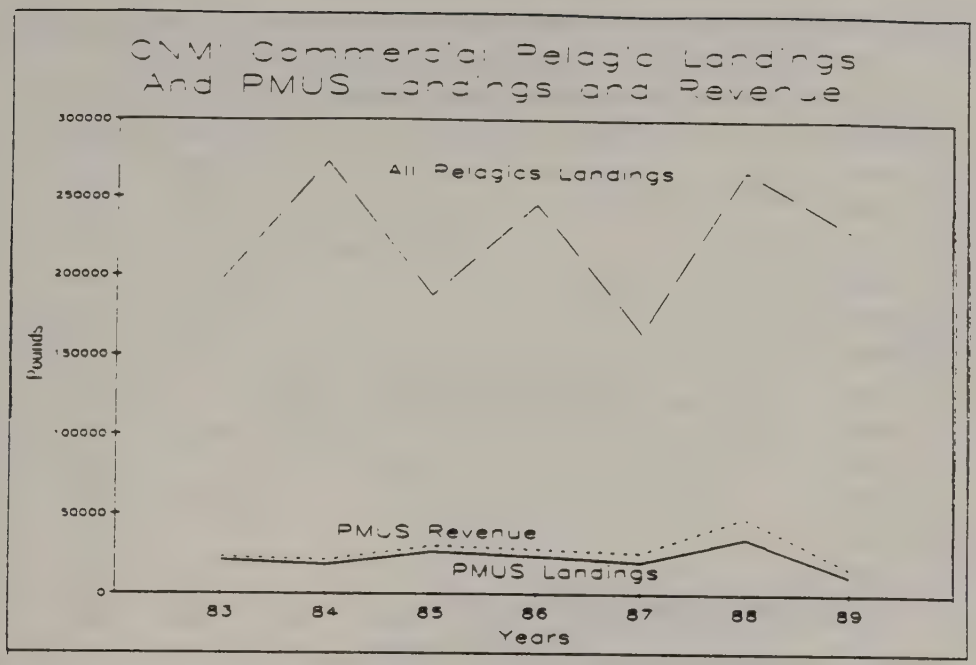
Standard fishery performance tables and figures for the Northern Marian Islands fishery are presented on the next several pages.

TABLE 5
CNMI 1989 COMMERCIAL PELAGIC SPECIES LANDINGS

Species	Pounds	Revenue	$/Lb.
Trollfish	249	398	1.60
Barracuda	137	189	1.38
Dolphin (mahimahi)	5856	8689	1.48
Marlin	4563	6084	1.33
Rainbow runner	142	249	1.75
Wahoo	1257	1961	1.56
Skipjack tuna	206162	262905	1.28
Dogtooth tuna	2974	4901	1.65
Yellowfin tuna	8087	13766	1.70
Pelagic Total:	229427	299142	1.30
PMUS Total:	11676	16734	1.43

All data analyzed for the CNMI pelagics fishery is from the Division of Fish and Wildlife's (DFW) Commercial Landings System, which is based on completion and submission of "trip ticket" invoices by first-level purchasers of fresh fish. This includes virtually all fish wholesalers, fish markets, stores, restaurants, hotels, and roadside fish mobiles on the main island of Saipan. It does not include any sales data from other CNMI islands. Staff of DFW routinely contact each known vendor to collect completed forms and to distribute additional invoice books. Although this data collection system has been in operation since the mid-1970's, only data collected since 1983 are considered accurate enough to be comparable for most aspects of the fisheries. No actual measure of fishing method, effort, or location are available within this system. However, the trolling method is use to capture virtually all pelagics caught, and effort can be calculated on a trip basis.

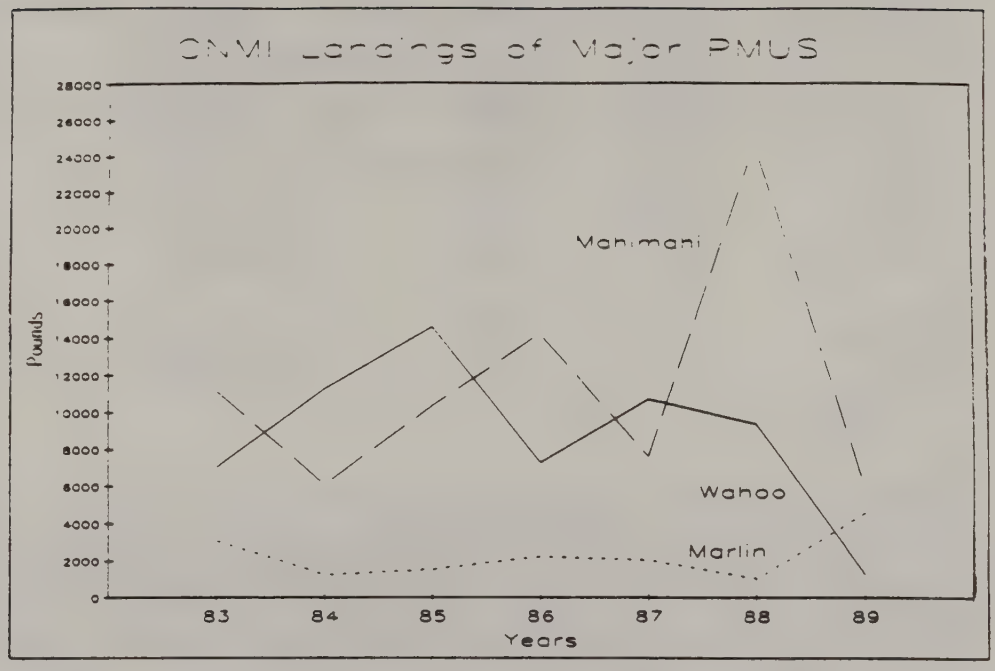
FIGURE 25



Calculations: The total landings of all pelagic species, all PMUS landings, and all PMUS revenue are simply summed from the recorded data base values.

Interpretations: The PMUS are obviously a small portion of the total pelagics catch. Virtually all are caught trolling. Most trolling trips typically target skipjack tuna or mahimahi in season. It may be interesting to note that the even-year peaks in the total pelagic fishery mirror a similar pattern in American Samoa, but are fairly different from Guam's total pelagic fishery. No explanation is known, or suggested.

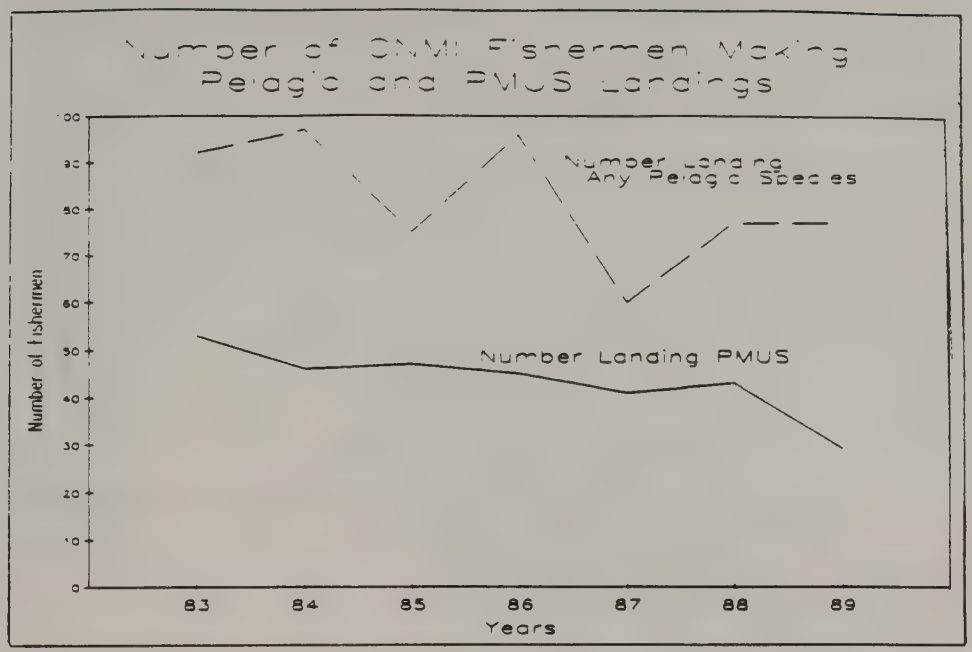
FIGURE 26



Calculations: The annual commercial landings of the major PMUS are summed directly from the data base.

Interpretations: The record high landings of mahimahi in 1988 was also reflected in the Guam fishery. No explanation is known for the definite downward trend in the landings of wahoo, which were the lowest in history in 1989, but lack of targeting by fishermen may be the most likely reason. The 1989 landings of blue marlin were the highest on record, but the fish were all small, mostly around 100 pounds. Guam also had record high marlin landings in 1989.

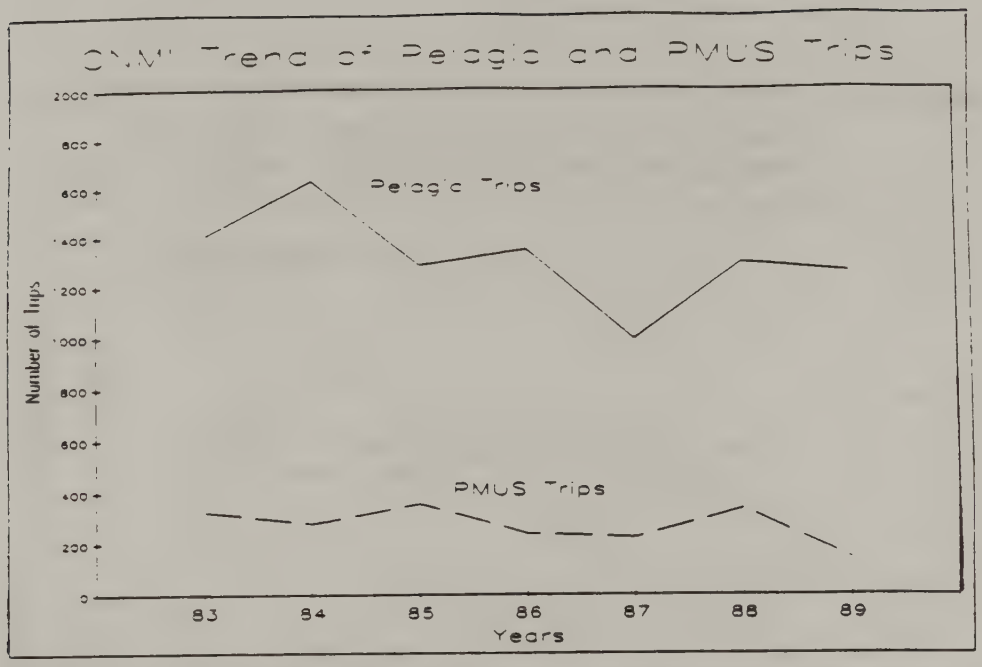
FIGURE 27



Calculations: Each invoice records the fisherman from whom the fish were purchased, and DFW staff code this information into the commercial landings data base. The unique number of fishermen who sold any pelagic species, including PMUS, and those who sold any PMUS are calculated directly from the data base, regardless of the level of sales.

Interpretations: There is a slight downward trend in both lines, indicating that the number of fishermen participating in the commercial pelagic fishery is declining. This is a bit at odds with the fact that the total number of boats on Saipan is definitely growing. The difference between the two lines is most likely a result of the significant skipjack tuna fishery. Evidently a fair number of trollers catch no PMUS when targeting tuna. This could be investigated using existing data if it is any concern.

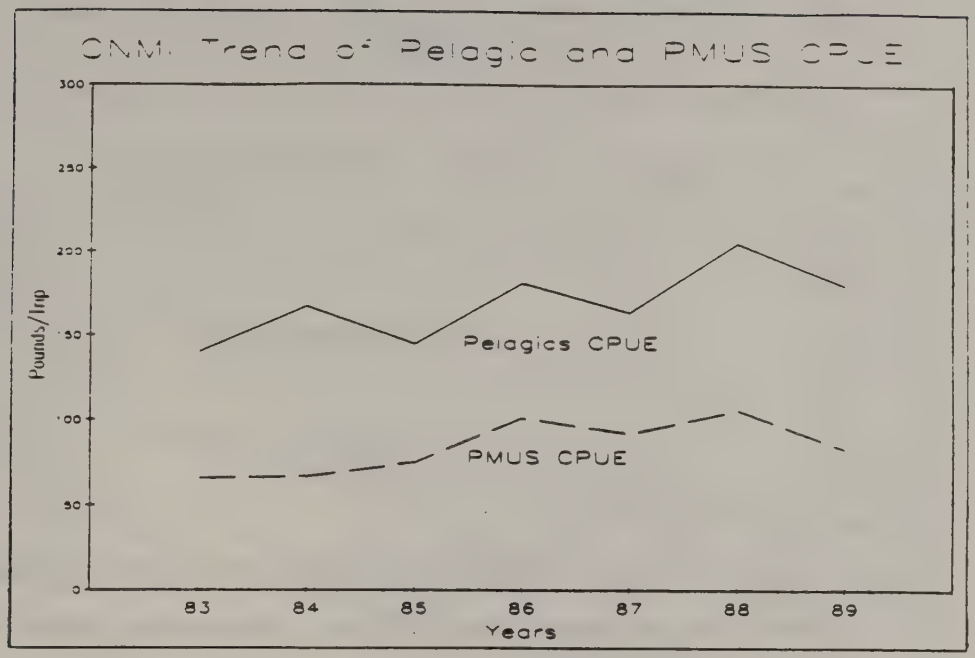
FIGURE 28



Calculations: The number of trips is calculated based on the assumptions that no fisherman makes more than one trip per day, and all sales from a single trip are made on a single day.

Interpretations: The number of pelagic fishing trips appears to be slightly declining over time, just as the number of fishermen is declining.

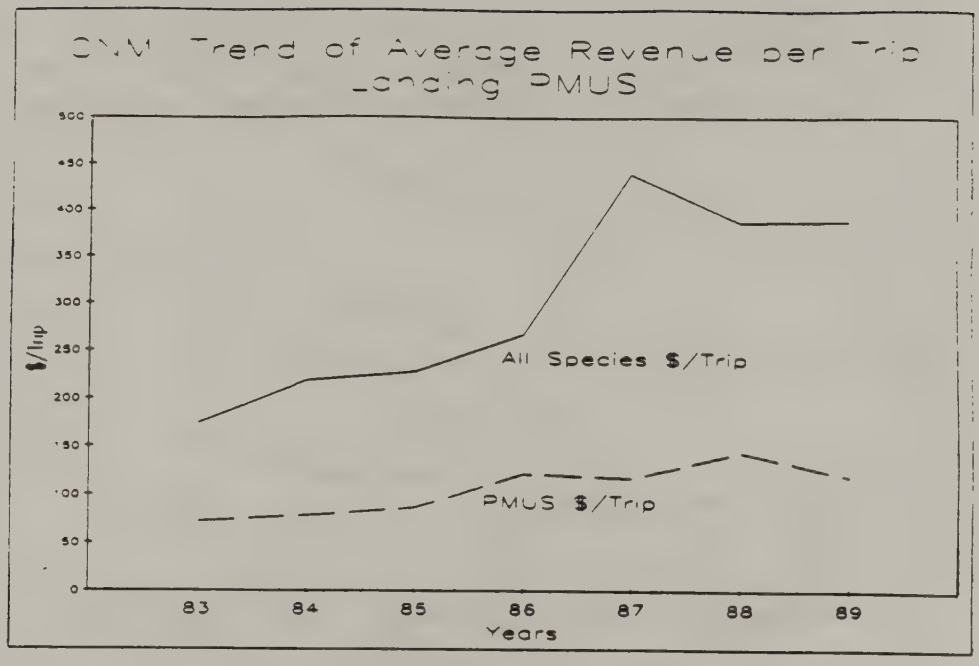
FIGURE 29



Calculations: The catch per trip of all pelagic species combined is calculated by dividing the total pelagic species landings by the number of trips which landed pelagics. The PMUS CPUE is similarly calculated using only the PMUS weight landed and the number of trips landing PMUS.

Interpretations: All calculations of CPUE from a commercial landings data base system are subject to significant bias because only successful trips can be included in the calculations. All zero catch trips, and probably most low catch trips are not included because no sales were recorded. However, the general trends in the lines are believed to be indicative of the general condition and abundance of pelagic fish. There appears to be a slight upward trends in both lines, indicating the fishery is in good shape. The decline in the PMUS CPUE in 1989 was a result of the poor catches of mahimahi and wahoo, in spite of the record landings of marlin.

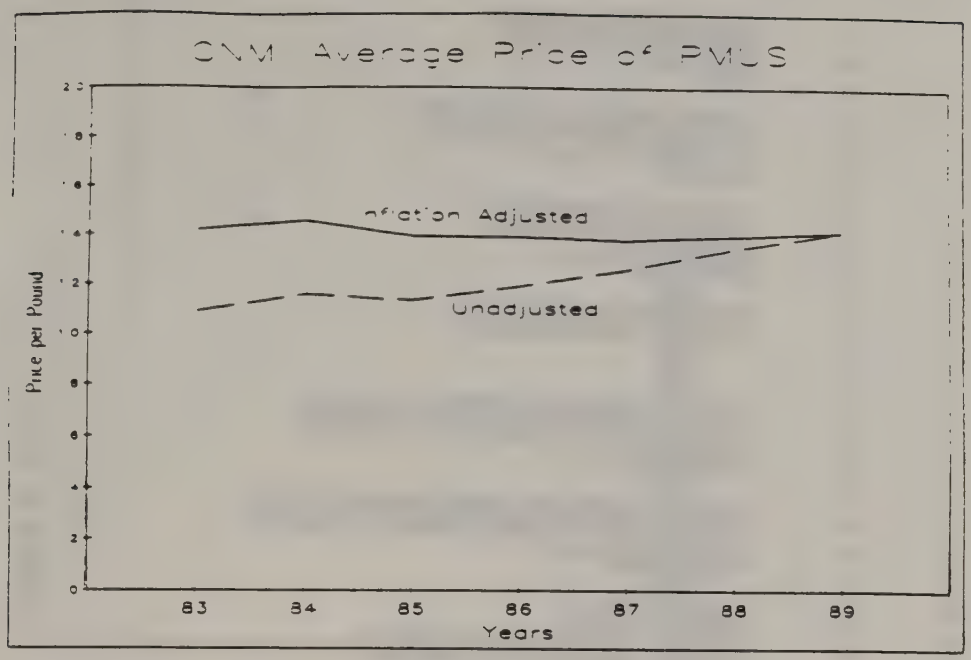
FIGURE 30



Calculations: These numbers are calculated by selecting from the data base all trips which landed at least some PMUS, and then calculating the average revenue of all species combined and the average revenue of only the PMUS.

Interpretations: The relative distance between these lines in an indication of the relative importance the PMUS are in the entire pelagic fishery. The distance between them has grown over the years showing the declining significance of the PMUS is the troll fishery.

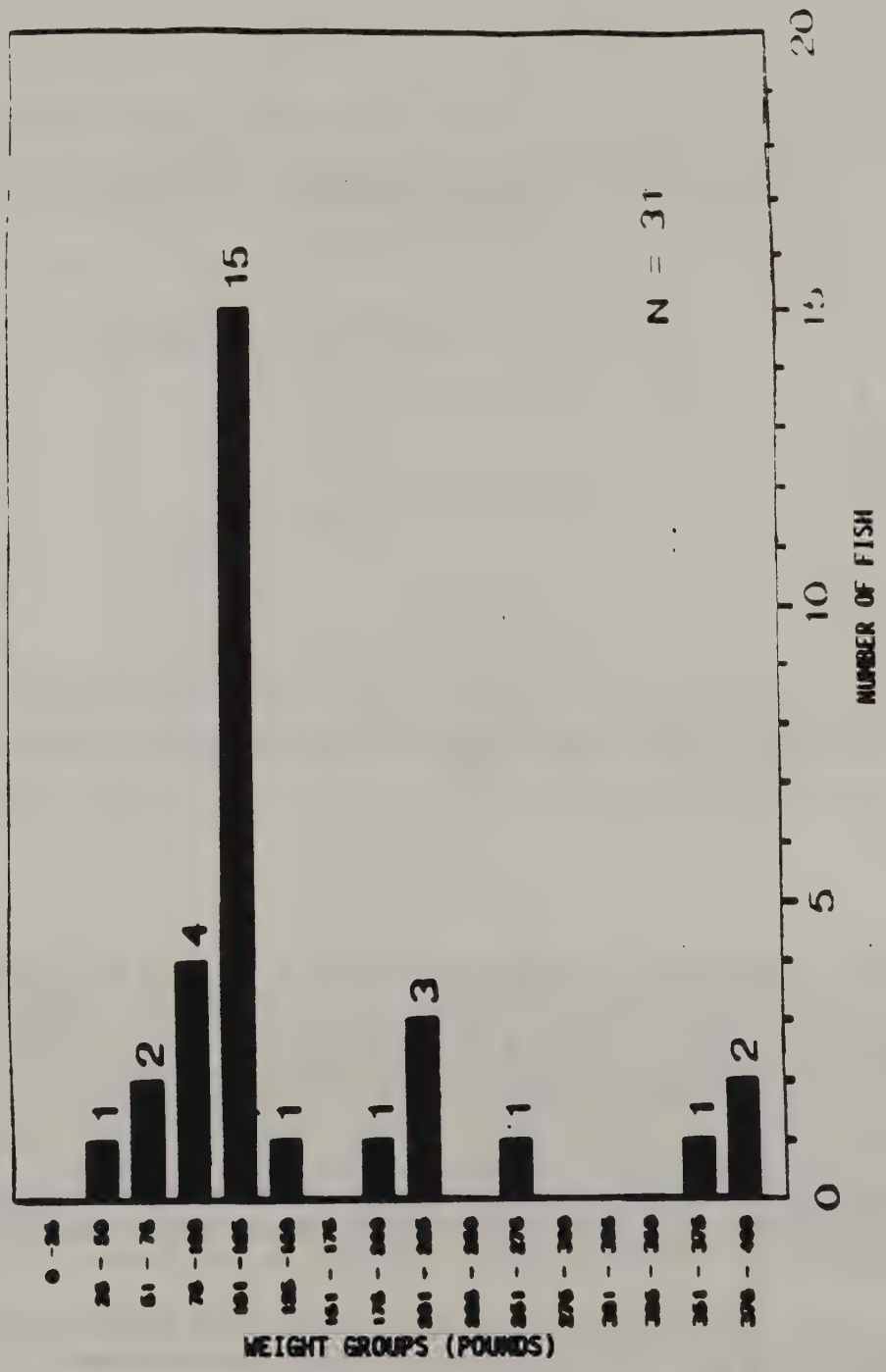
FIGURE 31



Calculations: The unadjusted average price of PMUS is calculated by dividing the total revenue generated by the sales of PMUS by the total weight of PMUS sold. The inflation adjustment is made by using the Consumer Price Index for Saipan and establishing the 1989 figure as the base from which to calculate expansion factors for all previous years (e.g. divide the 1989 CPI by the CPI for each other year), and then multiplying that factor by the unadjusted average price to obtain the adjusted average price for the given year. Saipan CPI data were not available for 1988 and 1989, therefore estimated CPIs were created by using Guam's 1988 figure and Hawaii's 1989 figure (Guam's 1989 figure was also not available, and was likewise estimated using Hawaii's).

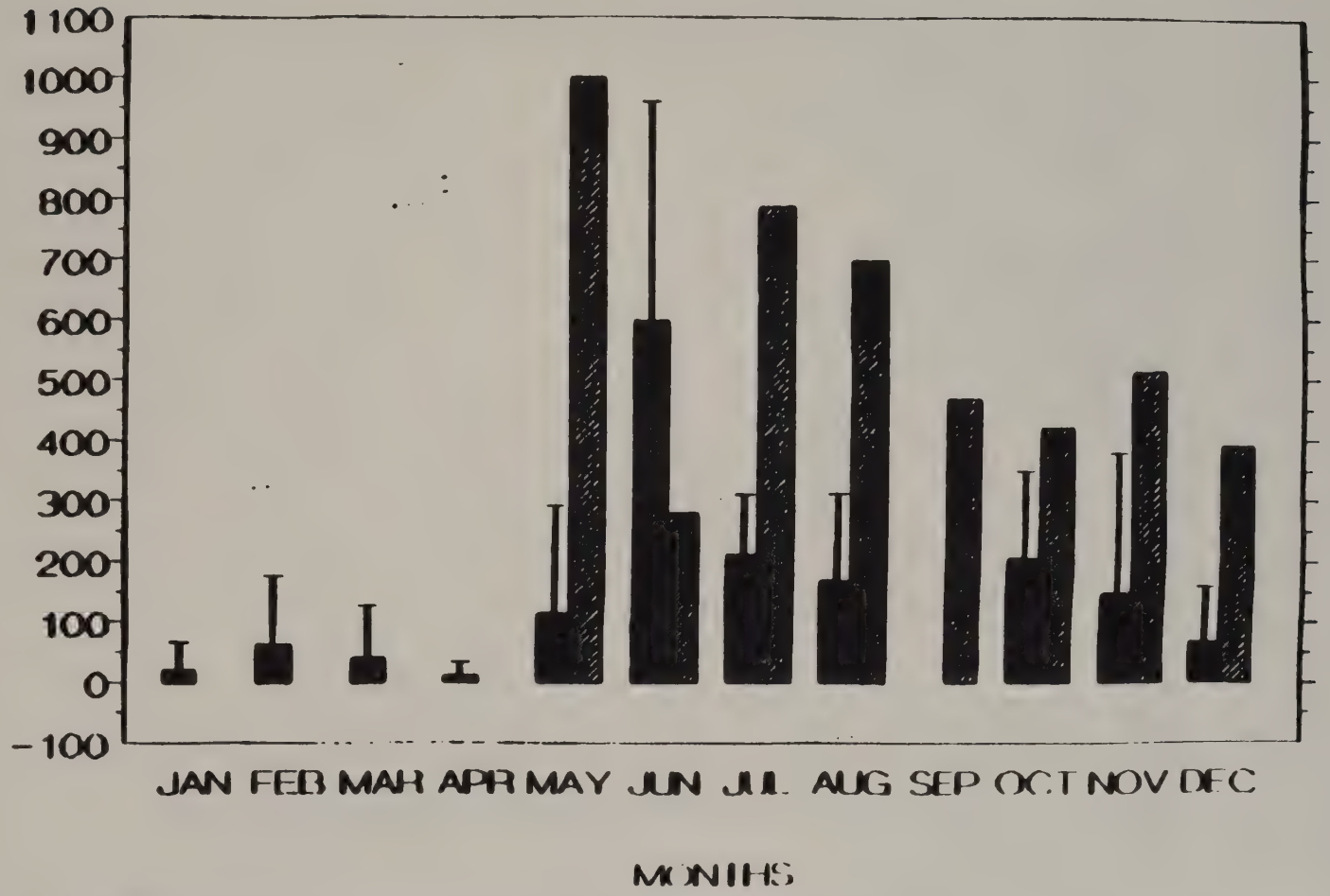
Interpretations: The unadjusted average price paid for PMUS has been steadily increasing over the time series, but the inflation adjusted price has remained essentially stable for the past 5 years.

FIGURE 32
SIZE DISTRIBUTION OF CNMI BLUE MARLIN CATCHES, 1985



Source: Division of Fish and Wildlife (DFW) commercial landings system.

FIGURE 33
SIZE OF 1989 COMMERCIAL BLUE MARLIN CATCHES VS. AVERAGE SIZE
OF 1985-88 BLUE MARLIN CATCHES



Source: Division of Fish and Wildlife (DFW) commercial landings system

MEAN CATCH 1985-1988

1989 CATCH

AMERICAN SAMOA

Standard fishery performance tables and figures for the American Samoa fishery are presented on the next several pages. In previous years, only commercial landings data were used in evaluating the domestic fishery. This year, estimates of total fishery effort and catch were used instead, and the data presented here on the American Samoa fishery are not comparable to the data presented in the previous annual reports.

All of the data presented on the American Samoa fishery come from the Department of Marine and Wildlife Resources statistical sampling and fishery monitoring data collection programs.

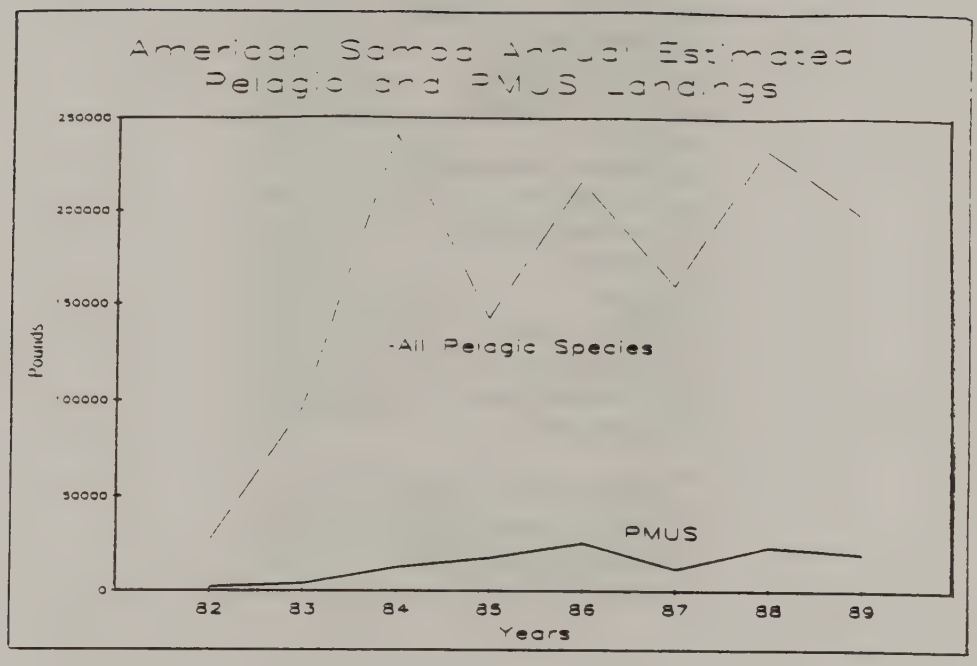
TABLE 6
AMERICAN SAMOA 1989 ESTIMATED
PELAGICS LANDINGS

Species	Pounds
Barracudas	830
Large barracuda	998
Small barracuda	1422
Sharks	4326
Troll fish	630
Dolphin (mahimahi)	3119
Blue marlin	9694
Sailfish	785
Rainbow runner	789
Wahoo	1443
Tunas	123
Skipjack tuna	119418
Dogtooth tuna	2742
Yellowfin tuna	51449
Kakakawa	479
Total Pelagic:	198248
Total PMUS:	19366
Total Tunas:	174212

TABLE 7
AMERICAN SAMOA 1989 ESTIMATED
AVERAGE PRICE OF PELAGIC SPECIES

Species	$/Lb.
Barracudas	1.41
Large barracuda	1.36
Small barracuda	1.61
Sharks	0.97
Dolphin (mahimahi)	1.94
Blue marlin	1.00
Rainbow runner	1.32
Wahoo	1.00
Tunas	1.00
Skipjack tuna	0.77
Dogtooth tuna	1.49
Yellowfin Tuna	1.45
Kawakawa	0.87
Pelagic Annual $/Lb.:	1.01
PMUS Annual $/Lb.:	1.21
Tunas Annual $/Lb.:	0.99

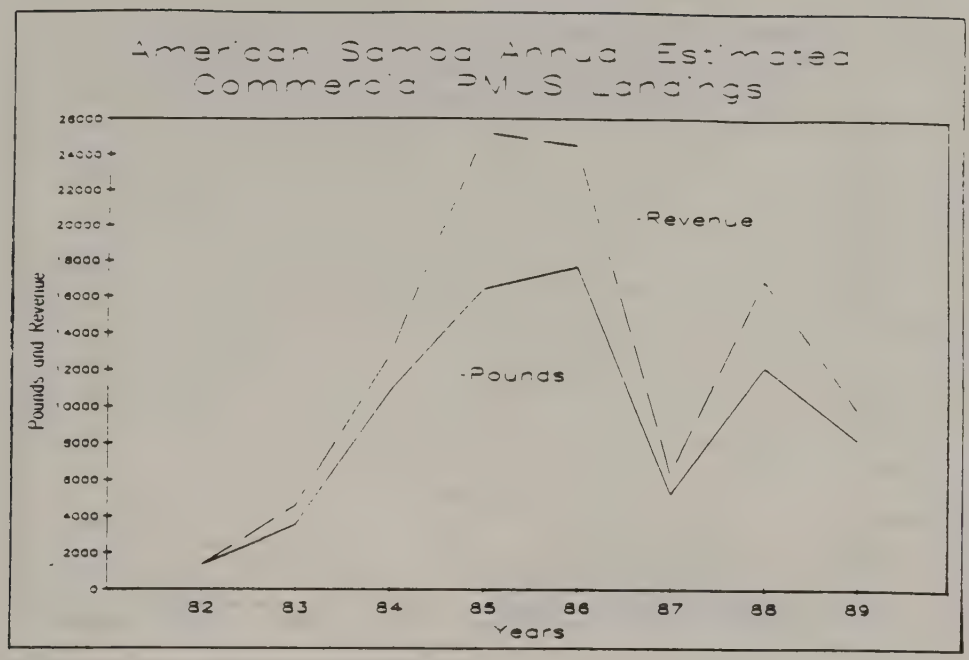
FIGURE 34



Calculations: The estimated total landings of all pelagic species and the PMUS separately are summed for all methods of fishing.

Interpretations: Trolling is responsible for the vast majority of the catch in all years, but some fairly substantial landings of primarily tuna species were made by a single domestic longline vessel which operated in 1983 to 1985. The peak pelagics landings in 1984 were a result of these "extra" landings. The longliner operated only a few months in either 1983 and 1985. The PMUS are a relatively minor part of the total pelagics landings, which are comprised mostly of tuna species.

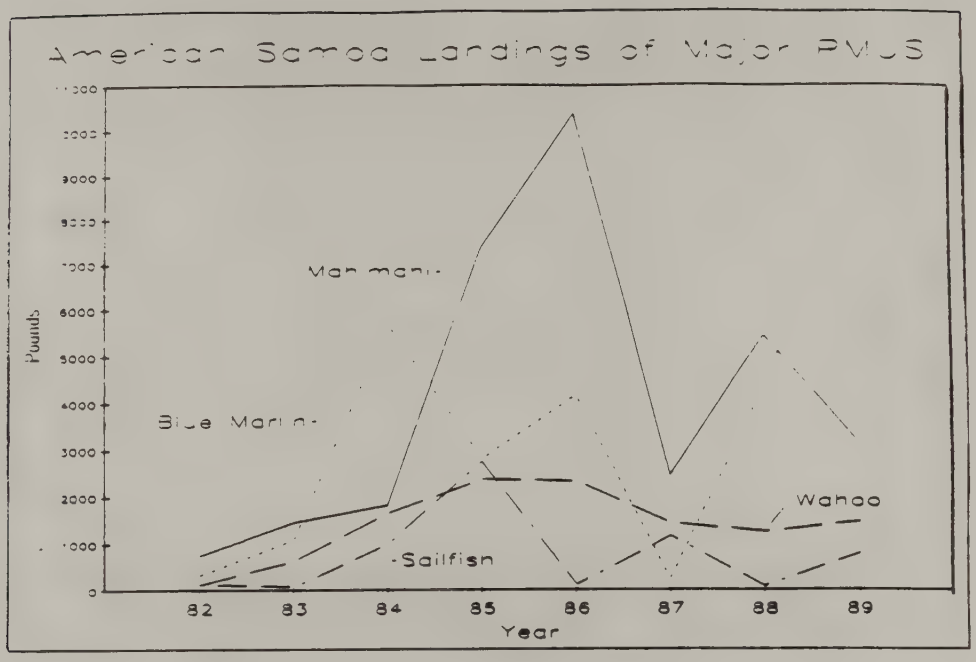
FIGURE 35



Calculations: The total estimated pounds and revenue of just the PMUS are summed for all methods of fishing for sold fish only.

Interpretations: The relatively high landings and revenue in 1985, 1986, and 1988 are a result of peak landings of mahimahi, as can be seen in the next figure.

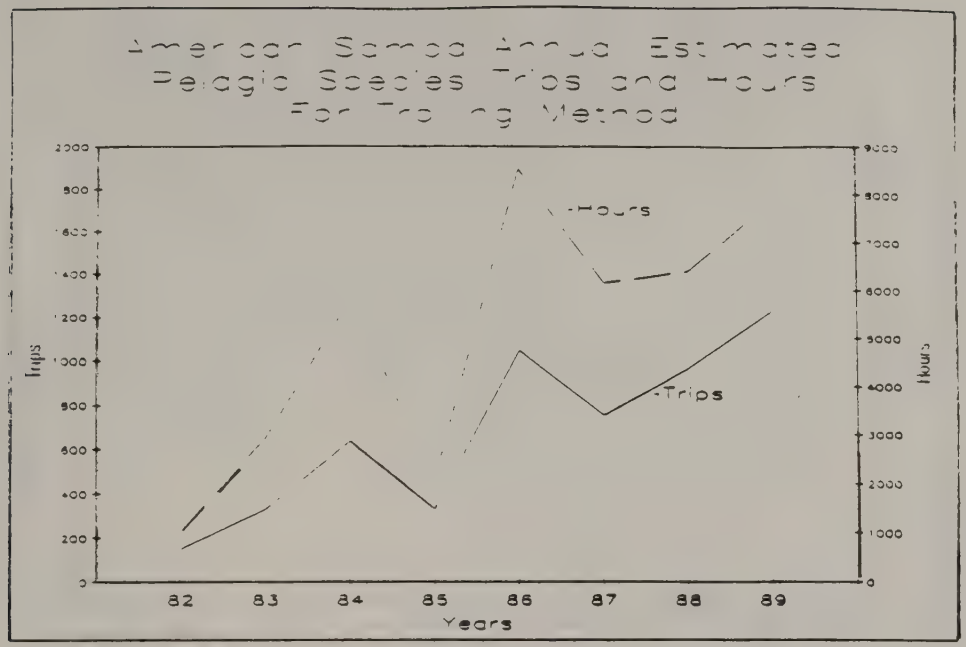
FIGURE 36



Calculations: The total estimated landings of the major PMUS are summed for all methods of fishing.

Interpretations: Individual species landings can be highly variable between years, but mahimahi is typically the most abundant PMUS species. A noteable exception is the record high level of blue marlin landings in 1989. Landings of blue marlin in Guam and the CNMI were also very high.

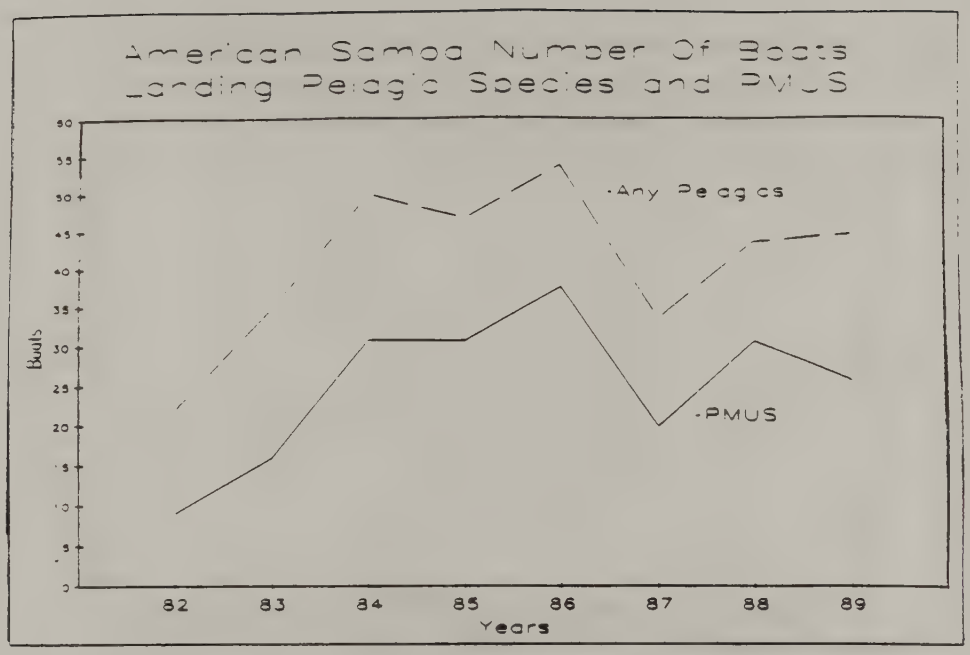
FIGURE 37



Calculations: The estimated total annual landings of all pelagic species is used as a base for calculating the estimated number of trips and hours spent fishing for pelagics by the trolling method. The estimated total longliner landings are subtracted from the total pelagic landings, and the resultant number is divided by the catch per hour (CPUE) for the trolling method to give an estimate of the hours trolled. The CPUE is calculated using only those trips which only trolled and for which the number of hours was recorded. The number of trips is calculated by dividing the estimated annual number of hours by the average length of a trolling trip.

Interpretations: The amount of effort being expended to catch pelagic species has generally been increasing since 1982, except for setbacks in 1985 and 1987 when portions of the fleet either stopped fishing or were lost to a hurricane.

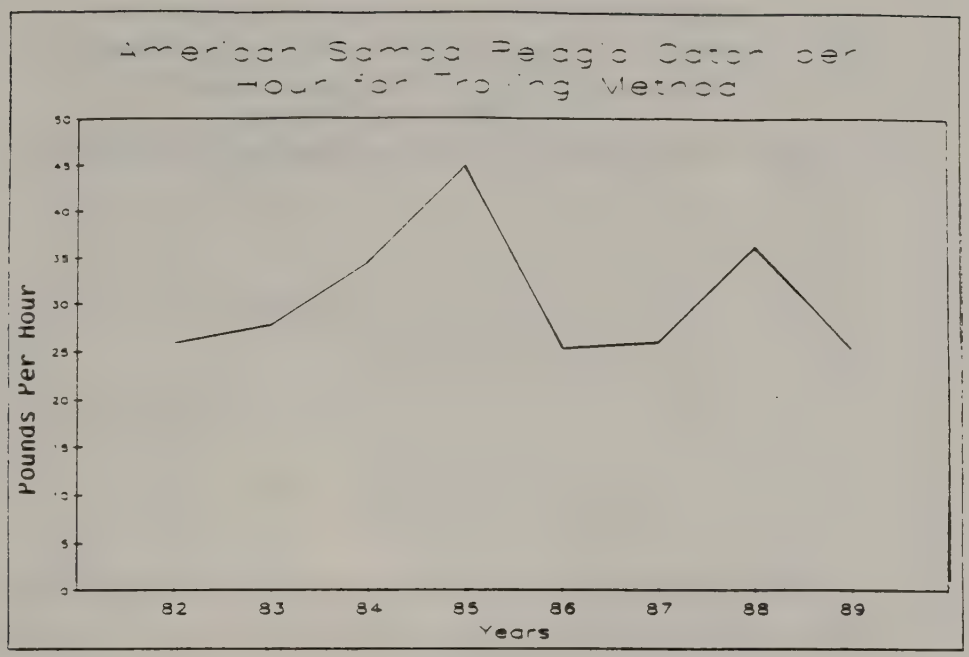
FIGURE 38



Calculations: The sampling program is extensive enough and the total number of boats is small enough to use the raw data base counts of the number of unique vessels for any given year as an accurate estimate of the total number of vessel operating during that year. When data are collected, the vessel is always identified.

Interpretations: There is a surprisingly fairly large difference in the number of boats which landed any pelagic species and the number of boats which landed at least one PMUS during any given year. Although this difference was not investigated, it seems logical that it is a result of many boats targeting skipjack tuna exclusively, the most abundant pelagic species.

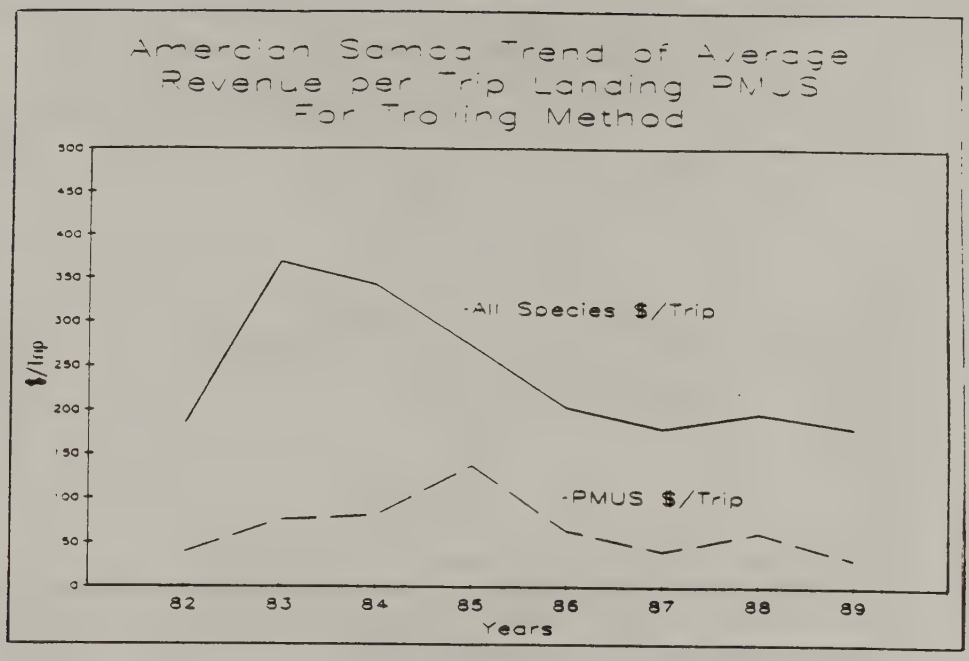
FIGURE 39



Calculations: Only those trips which used the trolling method exclusively and for which the effort was recorded in hours were used in the calculations for average CPUE for the trolling method. The CPUE for each trip was used as an observation to calculate the average. The CPUE was not calculated by summing the weight for all trips combined and dividing by the total hours fished.

Interpretations: The CPUE is variable over time, but appears to be stable.

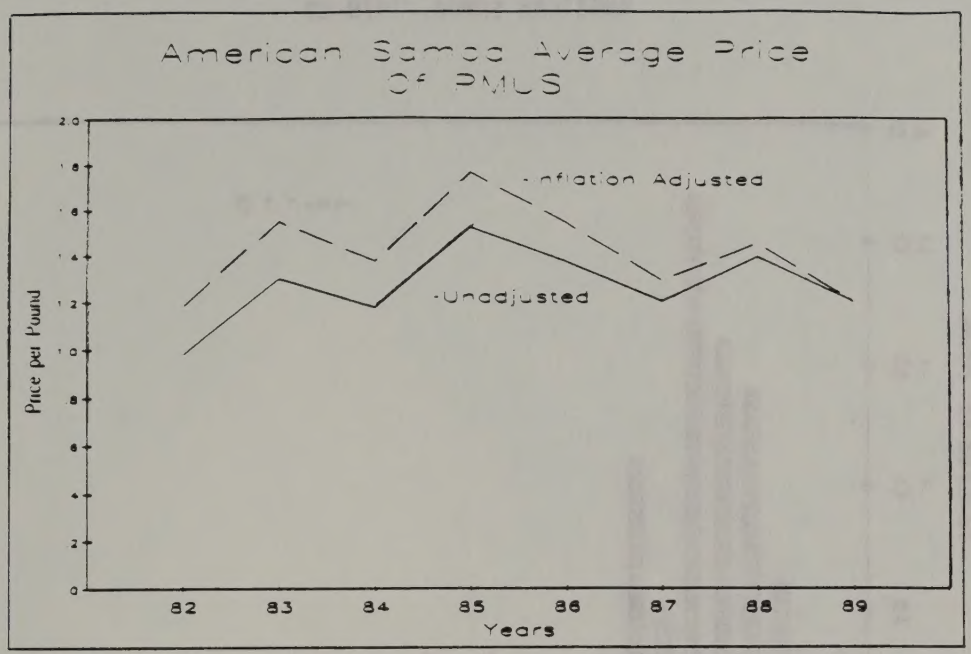
FIGURE 40



Calculations: For each trip which landed at least some PMUS, the total revenues were calculated for all species sold and for the PMUS sold.

Interpretations: The further these lines are apart, the less important the PMUS are in the total commercial pelagic landings. The PMUS have never comprised a large portion of the total revenue for the pelagic fisheries, but in 1985 they were about half of the total per trip revenue for the year. Since then, the proportion has varied between about 20-30%, but declined to about 18% in 1989.

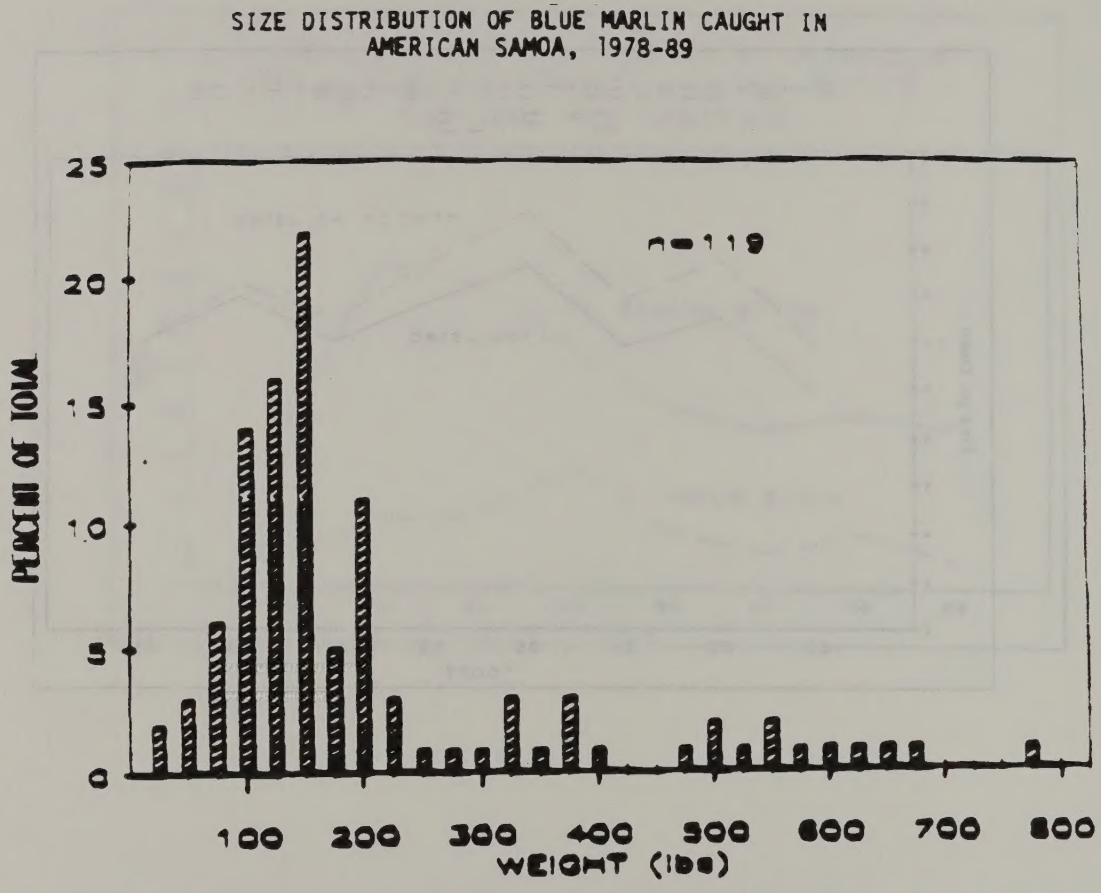
FIGURE 41



Calculations: The average price per pound for each year is calculated by dividing the estimated revenue by the estimated weight sold. The adjustment for inflation is made by multiplying the annual average price for a given year by the consumer price index (CPI) for American Samoa for 1989 and then dividing by the CPI for the given year. This effectively adjusts for inflation using 1989 as a base.

Interpretations: Both the unadjusted and inflation adjusted average price of PMUS have fluctuated over time, but have generally increased since 1982.

FIGURE 42



Source: DMWR statistical sampling and fishing monitoring and data collection programs.